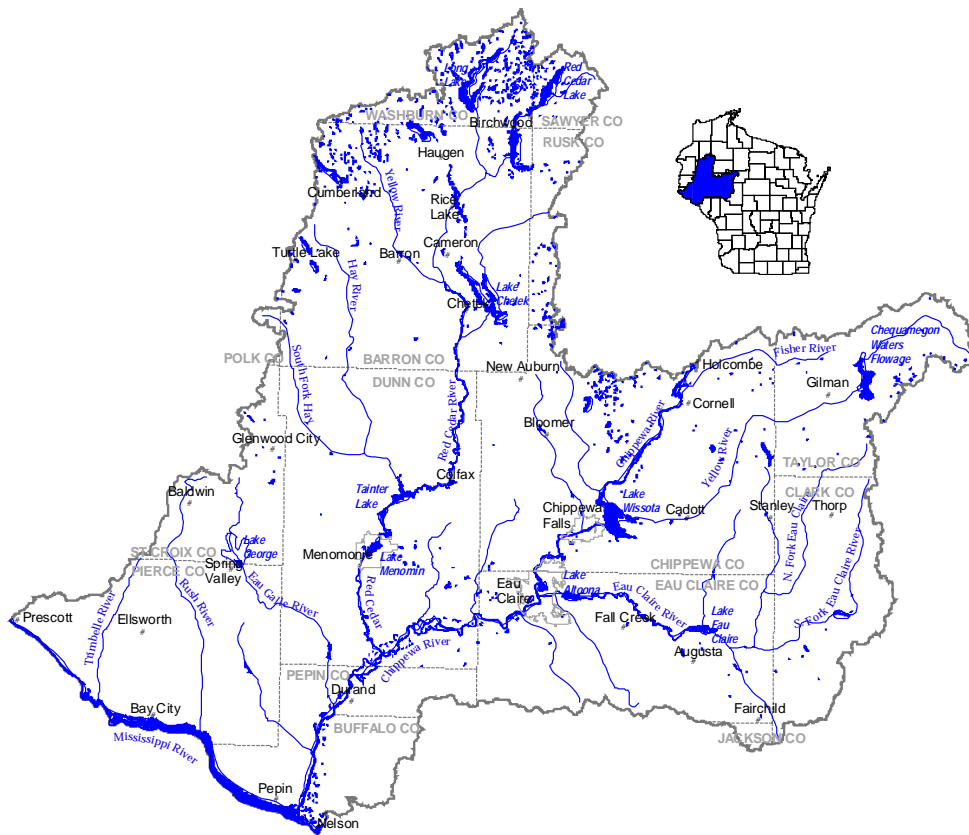


The State of the Lower Chippewa River Basin

2001

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A report by the
Wisconsin Department of Natural
Resources in cooperation with the
Lower Chippewa Basin Partnership
Team and stakeholders



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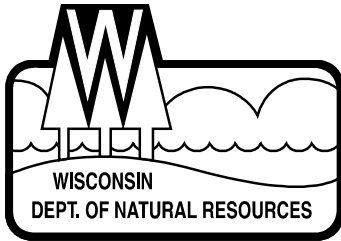
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Subject: Lower Chippewa River State of the Basin Report

Dear Reader:

This "State of the Basin" report for the Lower Chippewa River will provide you information about the historical and existing natural resources of what we believe to be one of the most special areas in Wisconsin. It is a starting point in our work to find out more about the rich land and water resources and provide some management strategies in the area drained by the Lower Chippewa River and tributaries. The Lower Chippewa Basin is one of the most biologically diverse areas in Wisconsin. It will only be through careful, cooperative planning and management that these gifts will remain for the future.

This report doesn't diminish other work that has been done and will be done. It needs to be read together with the Lower Chippewa River Basin Water Quality Management Plan, the Fish & Wildlife Habitat Plan 2001-2006, priority watershed plans, sewer service area plans, and county Land and Water Plans.

This report will help you understand how our natural resources interact with one another and what issues need to receive more attention. It will help provide direction for all of us who work and recreate here in the basin and what issues need public policy decisions in the near future.

We, at the Department of Natural Resources are working to fill information gaps. Waters Program staff are focusing on collection of data where surface waters are largely unknown. Some data will continue to be collected on previously inventoried waters to track trends. Updated and more comprehensive databases will help develop management strategies in the future. We will help restore native brook trout habitats, encourage restoring natural patterns in streams with removal of dams or fish passages. We have an opportunity to improve water quality by reducing excess nutrients to our streams, lakes and groundwater.

Our Lands Program staff is working on two major projects, one the Lower Chippewa Natural Area, primarily in Dunn, Pepin and Buffalo counties and the other the Western Prairie Habitat Restoration Area, primarily in Pierce, St. Croix and Polk counties. In each case, native grasslands will be protected along with the species that need that shrinking resource to survive. Recreational lands will be developed, linking the Red Cedar Trail to a Chippewa Valley trail system connecting Cornell, Chippewa Falls, Eau Claire and Menomonie.

To accomplish this we will be streamlining existing tasks or eliminating tasks to have resources available to proceed. We will be looking to cooperate with others to share information about the resources and opportunities to leverage dollars for habitat improvement and providing recreational opportunities to you.

Today the State of the Basin is one of opportunity. It is an opportunity for the people of the area and the Department of Natural Resources to work together to protect and enhance our lands and waters, so the Basin that has made the Chippewa Valley what it is will be stable to enhance our economy, benefit our fish and wildlife, and provide for our recreation.

We're proud of the work our staffs have put into this report, and especially so because much of it has involved the people of the Basin.

If we envision a tomorrow with clean water, restored grasslands, and a safe environment for all our citizens then together we can make it happen.

Sincerely,

John Paddock
Waters Leader

Robert Michelson
Lands Leader

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Table of Contents

Table of Contents	vii
List of Tables	viii
List of Figures	ix
List of Maps	ix
List of Appendices	ix
List of Acronyms	x
Glossary	xi
Executive Summary	1
Introduction.....	1
Basin Characteristics.....	1
Lower Chippewa Basin Past and Present.....	1
Department Presence in the Basin - Staff	1
Summary of Water Resources.....	2
Summary of Land Resources	2
Issues of Concern.....	3
Lower Chippewa River Basin Color Maps	5
Chapter 1 - Basin Overview	23
Introduction.....	23
An Integrated Approach to Resource Management.....	23
Purpose of the State of the Basin Report	23
The 1996 Water Quality Management Plan	23
Other Resource Management Plans	24
The Lower Chippewa River Basin - An Overview	25
The Lower Chippewa River Basin in the Wisconsin Landscape.....	25
Brief History of the Lower Chippewa River Basin.....	27
The Lower Chippewa River Basin Today.....	30
The Lower Chippewa River Basin Tomorrow	32
Creating a Sense of Place and Stewardship	32
Making Sound Land Use Decisions.....	33
Chapter 2 - Land and Water Resource Management Programs	37
The Foundation for Setting Management Policy	37
Wisconsin's Natural Resources Management History	37
Department of Natural Resources Created	37
The Department of Natural Resources Today	38
Department Presence in the Basin - Staff	39
Water Management Programs.....	40
Fisheries Management and Habitat Protection Program	40
Dam and Floodplain Management.....	42
Drinking Water and Groundwater	44
Waterways and Wetlands	44
Runoff Management	46
Wastewater and Stormwater	47
Land Management Programs	49
Forestry	49
Wildlife	50
Endangered Resources.....	51
State Parks and Trails	51
Facilities and Lands	52

Chapter 3 - Land and Water Resources Inventory	53
Water Resources	53
Water Resource Classification.....	53
Rivers and Streams and Associated Fisheries.....	54
Lakes and Flowages and Associated Fisheries	61
Dams and Floodplains	69
Drinking and Groundwater	72
Wetlands	82
Runoff from Nonpoint Sources.....	84
Wastewater and Point Source Inventory.....	87
Land Resources	90
Biological Communities	90
Ecological Landscapes.....	91
Public Lands	93
Private Lands	96
Chapter 4 - Partners and Priorities	99
Wisconsin's Natural Resources Vision	99
The Fisheries, Wildlife and Habitat Management Plan for Wisconsin.....	99
The Lower Chippewa Basin Partner Team.....	100
The Red Cedar River Basin Project.....	101
Land and Water Resource Issues, Goals and Objectives	101
Priorities and Work Planning.....	101
Comment Codes within the Basin Goals and Objectives	102
Issues, Goals and Objectives	102
Bibliography	115

List of Tables

Table 1. DNR Land and Water Program Staff Working Primarily in the Lower Chippewa Basin.	39
Table 2. Number of Natural Lakes with Various Fisheries.....	63
Table 3. Aquatic Plant Community Characteristics in Natural Lakes.....	64
Table 4. Number of Flowages with Various Fisheries	67
Table 5. Aquatic Plant Community Characteristics in Flowages.....	68
Table 6 Communities with Floodplains	70
Table 7. Groundwater Ranking in Watersheds	73
Table 8. Nitrate and Pesticide Contaminants in Wells	76
Table 9. Atrazine Prohibition Areas.....	77
Table 10. Special Well Construction Advisory Areas.....	77
Table 11. Number of High Capacity Wells in Counties or Portions of Counties in the Basin	78
Table 12. Public Water Supplies in the Basin	78
Table 13. Communities with Wellhead Protection Plans Planned or Approved.....	80
Table 14. Wetland Classification in the Lower Chippewa River Basin.....	83
Table 15. Priority Watersheds in the Lower Chippewa River Basin	85
Table 16. Summary of Construction Site Erosion Control Permits in the Lower Chippewa Basin, 11/1996 to 11/2000.....	88
Table 17. Acres of CRP Lands by County from 1986-August 2000.....	97
Table 18. Managed Forest Law and the Forest Crop Law Lands	98

List of Figures

Figure 1 - Watershed Diagram	25
Figure 2 - Watershed Pollution Sources	25
Figure 3 - Knapp Stout Company	28
Figure 4 - Population Projections	30
Figure 5 - Number of Farms in 7 Counties	31
Figure 6 - Number of Farm Acres in 7 Counties	31
Figure 7 - 18 Mile Creek - After Restoration	36
Figure 8 - 18 Mile Creek - Before Restoration	36
Figure 9 - Red Cedar River Basin	101

List of Maps

Map 1 - Lower Chippewa River Basin	5
Map 2 - Surficial Deposits	7
Map 3 - Historical and Current Vegetative Cover	9
Map 4 - Public Wells and Wellhead Protection Areas	11
Map 5 - Chippewa County Well Permits	13
Map 6 - Wetland Classes	15
Map 7 - Wastewater Point Sources	17
Map 8 - Ecological Landscapes	19
Map 9 - Land Ownership	21

List of Appendices

Appendix 1 - Summary of County Land and Water Conservation Plans	A1-1
Appendix 2 - Goals of the Smart Growth Program	A2-1
Appendix 3 - Outstanding and Exceptional Resource Waters of the Lower Chippewa River Basin	A3-1
Appendix 4 - Lower Chippewa Basin 303(d) Waters	A4-1
Appendix 5 - Water Quality Trends Analysis for the Lower Chippewa River	A5-1
Appendix 6 - Watershed Tables for the Lower Chippewa River Basin	A6-1
Appendix 7 - Watershed Ranking for Surface and Groundwater	A7-1
Appendix 8 - Public Lands in the Lower Chippewa Basin	A8-1
Appendix 9 - Prioritized Natural Resources Issues	A9-1
Appendix 10 - Basin Monitoring and Management Schedules and Plans	A10-1

List of Acronyms

BMP	Best Management Practice
CDC	Center for Disease Control
CFSA	Consolidated Farm Services Agency (United States Department of Agriculture)
COE	Corps of Engineers
COM	Department of Commerce
CREP	Conservation Reserve Enhancement Program
CRP	Federal Cropland Reserve Program
DATCP	Wisconsin Department of Agriculture, Trade, and Consumer Protection
DNR	Wisconsin Department of Natural Resources
DOA	Department of Agriculture
DOT	Department of Transportation
ECPA	Electric Consumers Protection Act
EL	Ecological Landscape
EPA	Environmental Protection Agency
ERW	Exceptional Resource Water
FERC	Federal Energy Regulatory Commission
FHM	Flood Hazard Mitigation
FIP	Forest Incentives Program
FQI	Floristic Quality Index
FSA	Farm Service Agency
FWH	Fisheries, Wildlife & Habitat Management Plan
FWS	Fish & Wildlife Service
GMU	Geographical Management Unit
GRN	Groundwater Retrieval Network
ICS	Incident Command System
IEM	Integrated Ecosystem Management
LCD	Land Conservation Department
LWCD	Land and Water Conservation Department
LUST	Leaking Underground Storage Tank
MCL	Maximum Contaminant Level
NHI	Natural Heritage Inventory
NPM	Nutrient and Pest Management
NRB	Natural Resources Board
NRCS	Natural Resource Conservation Service
ORAP	Outdoor Recreation Action Program
ORW	Outstanding Resource Water
PWS	Priority Watershed Program
SDWA	Federal Safe Drinking Water Act
SIP	Stewardship Incentive Program
SIP	Strategic Implementation Plan
SNA	State Natural Area
TMDL	Total Maximum Daily Load
TRM	Targeted Runoff Management
TSI	Trophic State Index
USDA	United States Department of Agriculture
UWEX	University of Wisconsin-Extension
VOC	Volatile Organic Compound
WAL	Wisconsin Association of Lakes
WCR	West Central Region (of the WDNR)
WDNR	Wisconsin Department of Natural Resources
WFLGP	Wisconsin Forest Landowner Grant Program

WHIP	Wildlife Habitat Incentive Program
WHPP	Wellhead Protection Plan
WPA	Waterfowl Production Area
WPDES	Wisconsin Pollutant Discharge Elimination System [permit system]
WRP	Wetlands Reserve Program

Glossary

ALGAE:

A group of microscopic, photosynthetic water plants. Algae give off oxygen during the day as a product of photosynthesis and consume oxygen during the night as a result of respiration. Therefore, algae affect the oxygen content of water. Nutrient-enriched water increases algae growth.

AMMONIA:

A form of nitrogen (NH₃) found in human and animal wastes. Ammonia can be toxic to aquatic life.

BACTERIA:

Single-cell, microscopic organisms. Some can cause disease, but others are important in organic waste stabilization.

BASIN:

A large area of land that drains to a major river or lake. Wisconsin is divided into about 20 basins, which are defined partially on drainage boundaries and partially on political boundaries, such as county lines. Each basin contains a number of watersheds (see Watersheds).

BASIN PLAN:

A plan that documents water quality conditions in a drainage basin and makes recommendations to protect and improve basin water quality. Each basin in Wisconsin must have a plan prepared for it, according to section 208 of the Clean Water Act.

BEST MANAGEMENT PRACTICE (BMP):

The most effective, practical measures to control nonpoint sources of pollutants that runoff from land surfaces.

BIOLOGICAL COMMUNITIES:

Areas that are defined and described based on a variety of factors including geographic location, species composition, topography, moisture, temperature, soils and climate. Biological communities in the Lower Chippewa Basin include: northern forests, southern forests, oak savannas, oak and pine barrens, grasslands, wetlands, and aquatic systems.

BIOLOGICAL USE CLASSIFICATION:

Description of fish species and other aquatic organisms which a stream system can support. A water body is *designated* as being in a biological use class based on the ability of a stream to provide suitable habitat and water quality conditions for fish and other aquatic life. See *Cold Water Communities (COLD)*, *Warm Water Sport Fish Communities (WWSF)*, *Warm Water Forage Fish Communities (WWFF)*, *Limited Forage Fish Communities (LFF)*.

BUFFER STRIPS:

Strips of grass or other erosion-resisting vegetation between disturbed areas and a stream or lake.

CATEGORICAL LIMITS:

All point source discharges are required to provide a basic level of treatment. For municipal wastewater treatment plants this is secondary treatment (30 mg/l effluent limits for SS and BOD). For industry the level depends on the type of industry and the level of production. More stringent effluent limits are required, if necessary, to meet water quality standards.

CLASS I TROUT STREAM:

High quality stream where trout populations are sustained by natural reproduction. See "Biological Use Classification".

CLASS II TROUT STREAM:

Trout stream with some natural reproduction but may need stocking to maintain a desirable trout fishery. See "Biological Use Classification".

CLASS III TROUT STREAM:

Trout stream with no natural reproduction and requires annual stocking of legal-size fish to provide sport fishing. See "Biological Use Classification".

CLEAN WATER ACT:

See "Public Law 92-500."

COLD WATER COMMUNITY (COLD):

Includes surface waters capable of supporting a community of coldwater fish and other aquatic life or serving as a spawning area for coldwater fish species. Within the COLD biological use classification, trout streams are further classified. See Class I, Class II and Class III.

CONSUMPTION ADVISORY:

A health warning issued by DNR that recommends people limit the fish they eat from some rivers and lakes based on the levels of toxic contaminants found in the fish.

CONTAMINANT:

Some material that has been added to water that is not normally present. This is different from a pollutant, which suggests there is too much of the material present.

COST-EFFECTIVE:

A level of treatment or management with the greatest incremental benefit for the money spent.

DESIGNATION:

Identification of a waterbody as belonging to a specific use classification. See "Biological Use Classification".

DISSOLVED OXYGEN (DO):

Oxygen dissolved in water. Low levels of dissolved oxygen cause bad smelling water and threaten fish survival. Low levels of dissolved oxygen often result from inadequate wastewater treatment. The DNR considers 5 ppm DO necessary for fish and aquatic life.

DRAINAGE AREA:

An area of land defined by the surrounding topography that drains to a lake or stream. Drainage areas can be defined on a scale ranging from very small to very large. See "Watershed".

ECOLOGICAL LANDSCAPE:

A *geographic area* that has similar land uses and ecological themes throughout. Ecological Landscape areas within the Lower Chippewa basin include: Farm and Forest Transition, Central Sand Plains, Western Coulees and Ridges, North Central Forest, and Western Prairie.

ECOSYSTEM:

The interacting system of biological community and its nonliving surroundings.

EFFLUENT:

Solid, liquid or gas wastes (byproducts) that are disposed on land, in water or in air. Effluent generally means wastewater discharges.

EFFLUENT LIMITS:

The DNR issues WPDES permits establishing the maximum amount of pollutant to be discharged to a receiving stream. Limits depend on the pollutant and the water quality standards that apply for the receiving waters.

ENVIRONMENTAL PROTECTION AGENCY (USEPA):

The federal agency that is responsible for enforcing federal environmental regulations. The Environmental Protection Agency delegates some of its responsibilities for water, air and solid waste pollution control to state agencies.

EROSION:

The wearing away of the land surface by wind or water.

EUTROPHIC:

Refers to a nutrient-rich lake or stream. Large amounts of algae and weeds characterize a eutrophic lake (see also "Oligotrophic" and "Mesotrophic").

EUTROPHICATION:

The process of nutrient enrichment of a lake leading to increased production of aquatic organisms. Eutrophication can be accelerated by human activity such as agriculture and improper waste disposal.

GROUNDWATER:

Underground water-bearing areas generally within the boundaries of a watershed, which fill internal passageways of porous geologic formations (aquifers) with water that flows in response to gravity and pressure. Often used as the source of water for communities and industries.

HABITAT:

The place or type of environment where a plant or animal naturally lives and grows.

HAZARDOUS WASTE:

Waste that has been found to be fatal to humans or animals in low doses, or is otherwise capable of causing or significantly contributing to an increase in serious irreversible, or incapacitating reversible, illness.

HEAVY METALS:

Metals present in municipal and industrial wastes that pose long-term environmental hazards if not properly disposed. Heavy metals can contaminate ground and surface waters, fish and other food stuffs. The metals of most concern are: arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium and zinc.

HERBICIDE:

A type of pesticide that is specifically designed to kill plants and can also be toxic to other organisms.

LANDFILL:

A conventional sanitary landfill is "where solid waste is disposed on land by utilizing the principles of engineering to confine the solid waste to the smallest practical area, to reduce it to the smallest practical volume, and to cover it with a layer of earth or other approved material as required." Hazardous wastes frequently require various types of pretreatment before they are disposed of, i.e., neutralization, chemical fixation, or encapsulation. Neutralizing and disposing of wastes should be considered a last resort. Repurifying and reusing waste materials or recycling them for another use may be less costly.

LEACHATE:

The contaminated liquid which seeps from a pile or cell of solid materials and which contains water, dissolved and decomposing solids. Leachate may enter the groundwater and contaminate drinking water supplies.

MACROPHYTE:

A rooted aquatic plant.

MESOTROPHIC:

Refers to a moderately fertile nutrient level of a lake between the oligotrophic and eutrophic levels. (See also "Eutrophic" and "Oligotrophic.")

MILLIGRAMS PER LITER (mg/l):

A measure of the concentration of substance in water. For most pollution measurement this is the equivalent of "parts per million".

MITIGATION:

The effort to lessen the damages caused by a project, providing alternatives, compensating for losses or replacing lost values.

MUNICIPAL SLUDGE

The residual of the wastewater treatment process. Sludge generally contains substantial levels of nitrogen and organic material as well as phosphorus, potassium, and nutrients.

NONPOINT SOURCE POLLUTION (NPS):

Pollution whose sources cannot be traced to a single point such as a municipal or industrial wastewater treatment plant discharge pipe. Nonpoint sources include eroding farmland and construction sites, urban streets, and barnyards. Pollutants from these sources reach water bodies in runoff, which can best be controlled by proper land management.

OLIGOTROPHIC:

Refers to an unproductive and nutrient-poor lake. Such lakes typically have very clear water. (See also "Eutrophic" and "Mesotrophic.")

OUTFALL:

The mouth of a sewer or drainpipe where effluent from a wastewater treatment plant is discharged.

OUTSTANDING RESOURCE WATER (ORW):

Rivers, streams or lakes that have been designated as valuable fisheries, hydrologically or geologically unique features, outstanding recreational opportunities or unique environmental settings that are not affected significantly by human activities. In designated ORW waters, effluent from all new permitted discharges must be of a quality equal to or better than the water receiving the discharge. A listing of these designated waters occurs in NR 102, Wisconsin Administrative Code.

PARTNER TEAM:

Individuals and organizations with an interest or stake in natural resources in the basin. The Lower Chippewa Partner Team consists of individuals from eight of the counties in the Lower Chippewa and includes individuals representing businesses, non-profit organizations, local or state governments, and universities.

PESTICIDE:

Any chemical agent used to control specific organisms, such as insecticides, herbicides, fungicides, etc.

PH:

A measure of acidity or alkalinity, measured on a scale of 0 to 14 with 7 being neutral, 0 being most acid, and 14 being most alkaline.

PHOSPHORUS:

A nutrient that, when reaching lakes in excess amounts, can lead to over-fertile conditions and algae blooms.

PLANKTON:

Tiny plants and animals that live in water.

POINT SOURCES:

Sources of pollution that have discrete discharges, usually from a pipe or outfall.

POLLUTION:

The presence of materials or energy whose nature, location, or quantity produces undesired environmental effects.

POLYCHLORINATED BIPHENYLS(PCBs):

A group of 209 compounds, PCBs have been manufactured since 1929 for such common uses as electrical insulation and heating/cooling equipment, because they resist wear and chemical breakdown. Although banned in 1979 because of their toxicity, they have been detected on air, land and water. Recent surveys found PCBs in every section of the country, even those remote from PCB manufacturers.

PRIORITY WATERSHED:

A drainage area selected to receive Wisconsin Fund money to help pay the cost of controlling nonpoint source pollution. Because money is limited, only watersheds where problems are critical, control is practical, and cooperation is likely are selected for funding.

PRODUCTIVITY:

A measure of the amount of living matter which is supported by an environment over a specific period of time. Often described in terms of algae production for a lake.

PUBLIC LAW 92-500 (CLEAN WATER ACT):

The federal law that sets national policy for improving and protecting the quality of the nation's waters. The law set a timetable for the cleanup of the nation's waters and stated that they are to be fishable and swimmable. This also required all dischargers of pollutants to obtain a permit and meet the conditions of the permit. To accomplish this pollution cleanup, billions of dollars have been made available to help communities pay the cost of building sewage treatment facilities. Amendments in the Clean Water Act were made in 1977 by passage of Public Law 95-217, and in 1987.

PUBLIC PARTICIPATION:

The active involvement of interested and affected citizens in governmental decision-making.

RIPARIAN:

Belonging or relating to the bank of a lake, river or stream.

RIPRAP:

Broken rock, cobbles, or boulders placed on the bank of a stream to protect it against erosion.

RUNOFF:

Water from rain, snowmelt, or irrigation that flows over the ground surface and returns to streams. Runoff can collect pollutants from air or land and carry them to receiving waters.

SEDIMENT:

Soil particles suspended in and carried by water as a result of erosion.

SEPTIC SYSTEM:

Sewage treatment and disposal for homes not connected to sewer lines. Usually the system includes a tank and drain field. Solids settle to the bottom of the tank. Liquid percolates through the drain field.

SEPTAGE:

The solids or wastewater generated by private on-site wastewater systems and treatment.

SOLID WASTE:

Unwanted or discharged material with insufficient liquid to be free flowing.

STORM SEWERS:

Systems of sewers that collect and transport rain and snow runoff. In areas that have separated sewers, such stormwater is not mixed with sanitary sewage.

SUSPENDED SOLIDS (SS):

Small particles of solid pollutants suspended in water.

TOTAL MAXIMUM DAILY LOADS (TMDLs):

The maximum amount of a pollutant that can be discharged into a stream without causing a violation of water quality standards.

TOXIC:

An adjective that describes a substance which is poisonous, or can kill or injure a person or plants and animals upon direct contact or long-term exposure. (Also, see toxic substance.)

TOXIC SUBSTANCE:

A chemical or mixture of chemicals which, through sufficient exposure, or ingestion, inhalation or assimilation by an organism, either directly from the environment or indirectly by ingestion through the food chain, will, on the basis of available information cause death, disease, behavioral or immunologic abnormalities, cancer, genetic mutations, or development of physiological malfunctions, including malfunctions in reproduction or physical deformations, in organisms or their offspring.

TROPHIC STATUS:

The level of growth or productivity of a lake as measured by phosphorus content, algae abundance, and depth of light penetration. (See also "Oligotrophic," "Mesotrophic," "Eutrophic..")

TURBIDITY:

Lack of water clarity. Turbidity is usually closely related to the amount of suspended solids in water.

UNIVERSITY OF WISCONSIN-EXTENSION (UWEX):

A special outreach and education branch of the state university system.

USE CLASSIFICATION:

See "Biological Use Classification".

WASTEWATER:

Water that has become contaminated as a byproduct of some human activity. Wastewater includes sewage, washwater and the water-borne wastes of industrial processes.

WASTE:

Unwanted materials left over from manufacturing processes, refuse from places of human habitation or animal habitation.

WATER QUALITY STANDARDS:

The legal basis and determination of the use of a water body and the water quality criteria, physical, chemical, or biological characteristics of a water body, that must be met to make it suitable for the specified use.

WATERSHED TABLE CODES:

See codes in Appendix 6: Watershed Tables

WATERSHED:

The land area that drains into a lake or river. Watersheds can be defined on scales ranging from very small to very large, such as the Mississippi River drainage basin. For management purposes the state of Wisconsin has 333 identified watersheds.

WETLANDS:

Areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a variety of vegetative or aquatic life. Wetland vegetation requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs and similar areas.

WISCONSIN ADMINISTRATIVE CODE:

The set of rules written and used by state agencies to implement state statutes. Administrative codes are subject to public hearing and have the force of law.

WISCONSIN NONPOINT SOURCE WATER POLLUTION ABATEMENT GRANT PROGRAM:

A state cost-share program established by the State Legislature in 1978 to help pay the costs of controlling nonpoint source pollution. Also known as the nonpoint source element of the Wisconsin Fund or the Priority Watershed Program.

WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM (WPDES):

A permit system to monitor and control the point source dischargers of wastewater in Wisconsin. Dischargers are required to have a discharge permit and meet the conditions it specifies.

Executive Summary

Introduction

The State of the Basin Report provides a snapshot of the current condition of land and water resources in the basin and a look at the programs and staff who seek to preserve and restore those resources. It creates a vehicle for increased interagency cooperation and public involvement, through identification and prioritization of issues and objectives.

The premise of creating a report to "paint a picture" of each basin in the state stemmed from the Department's decision to take an ecosystem approach to resource management rather than a program by program approach. This holistic approach enables increased coordination among programs. Many individuals from both the land and water teams of the Lower Chippewa provided narrative for the report. The Lower Chippewa Partnership Team also played a key role in the development of the report by working to identify issues of concern and assisting in the public involvement review process.

Basin Characteristics

The Lower Chippewa Basin consists of 24 watersheds and portions of 15 counties, draining 5,300 square miles of land from the Holcombe dam downstream to the Mississippi River at Nelson (see Map 1 - Lower Chippewa River Basin). Substantial portions of Barron, Dunn, Pierce, Pepin, Chippewa, Eau Claire and St. Croix Counties are located in the basin. In addition, Polk, Washburn, Sawyer, Rusk, Taylor, Clark, Jackson and Buffalo Counties are partially within the basin. The basin's diverse ecosystems range from the forests, lakes, swamps and bogs of the northern reaches, through agricultural lands nestled among meandering streams of the central portions to the rolling hills and prairies of the southern and western coulee region.

Lower Chippewa Basin Past and Present

Logging and agricultural land use dramatically transformed the pre-settlement ecosystem. At the present time, human population changes pose the biggest threat to native ecosystems and species. Sprawling development on the outskirts of cities and towns and conversion of agricultural lands to residential acres are fragmenting essential aquatic, shoreland, and terrestrial habitats. Increasing development pressure especially impacts lakes, streams and shorelands. These popular areas are being degraded even as we seek to enjoy their natural beauty and features to the fullest.

Department Presence in the Basin - Staff

About two-thirds of the Lower Chippewa River Basin is located in the Department's West Central Region, and the remainder is in the Northern Region. Together, approximately 120 permanent employees in the Land and Water Programs have part or all of their job responsibilities within the Lower Chippewa River Basin. Of these, approximately 55 work primarily within the Lower Chippewa River Basin.

Of about 50 Water Program staff, 26 work primarily within the Lower Chippewa River Basin, and of approximately 70 Land Program staff, about 29 work primarily within the Lower Chippewa River Basin.

Summary of Water Resources

Rivers and Streams

The Lower Chippewa River Basin has an abundant, diversified and unique river and stream resource. Streams in the basin range from high-gradient “coulee” type streams in the western-most portion of the basin to low-gradient sand-dominated streams in the central and eastern parts of the basin. These small streams support some of the state's finest coldwater trout fisheries and excellent yet under-appreciated warmwater sport fisheries. In addition to the abundant and diversified small streams, there are several major rivers in the basin. “Big rivers”, including the Chippewa, Red Cedar, Hay and Eau Claire Rivers, are complex and dynamic river resources. They provide habitat for several of the state's endangered and threatened aquatic species as well as unique and fragile plant and animal communities. Department partnerships with citizens, through the new Rivers and Streams Planning and Protection Grant Program, Habitat Improvement programs, Red Cedar Partnership and others are key to protecting, maintaining and enhancing the quality of these very complex, unique river and stream resources.

Lakes and Flowages

The Lower Chippewa River basin has approximately 300 lakes larger than 10 acres. There are also 79 named lakes and numerous unnamed lakes less than 10 acres. Lakes between 10 and 50 acres in size comprise over 80% of the 378 named lakes. Many of these lakes are a result of the glacial history of the basin. More than 80% of the natural lakes in the basin result from glaciers that pushed down from the north, into Barron, Washburn and Chippewa Counties.

The Lower Chippewa River basin has 69 flowages, which provide approximately 71% of the total acres of lake resources in the basin. Approximately 46% of these are larger than 100 acres, and 28% are larger than 500 acres. Barron and Chippewa Counties contain over 50% of the number and total acres of flowages in the basin. In Clark and Pierce County, flowages are the only lake resources present. Flowages also provide a majority of the lake resources in Dunn and Eau Claire Counties. Many of the smaller flowages (less than 50 acres) were created as shallow water impoundments for waterfowl production.

Six flowages on the Chippewa River within the Lower Chippewa Basin are the result of hydropower dams. One of these, Lake Wissota, is the largest water body in the basin. Numerous other flowages on basin streams and tributaries were created when dams were constructed for millponds, logging, and smaller sources of hydropower. Many of these dams remain in place, although they are no longer being used for their original purpose.

Summary of Land Resources

Biological Communities & Ecological Landscapes

Biological communities are defined and described based on a variety of factors including geographic location, species composition, topography, moisture, temperature, soils and climate. The Lower Chippewa Basin contains components of all seven biological communities: northern forests, southern forests, oak savannas, oak and pine barrens, grasslands, wetlands, and aquatic systems.

An ecological landscape is a *geographic area* that has similar land uses and ecological themes throughout. There are fifteen Ecological Landscape areas within Wisconsin, and five of these are found in the Lower Chippewa basin: Farm and Forest Transition, Central Sand Plains, Western Coulees and Ridges, North Central Forest, and Western Prairie

Issues of Concern

Land and water resource staff and the Partner Team worked together to identify important resource issues within the Lower Chippewa River Basin. These nine issues reflect the highest resource concerns of Department staff, the Basin Partner Team, and the public who attended open houses.

For each of the issues, staff and the Partner Team developed goals and objectives that were identified as most valuable for the resource needs of the Lower Chippewa River Basin. These goals and objectives are specific to the Basin but also reflect the Department's Strategic Goals, Strategic Implementation Plan and the Fisheries, Wildlife and Habitat Management Plan for Wisconsin - 2001 through 2007.

The nine issues are listed in order of relative importance based on input from DNR staff, the Partner Team and the public. The DNR has the skills, knowledge and resources to address many of these issues, goals and objectives; for some, other agencies or entities are more appropriate. Considerations for work effort expended by the WDNR on these issues will include the ability of the department to play a role in addressing the issue, the resource benefit that can be accomplished related to the issue and the timeliness of the issue for achieving results.

A. Habitat: Loss, impairment, and fragmentation of native habitats have jeopardized the ecosystem function of sustaining, balanced communities of aquatic and terrestrial, animal and plant populations.

B. Sediment and Nutrient Sources: Excessive sedimentation to surface waters and net importation of nutrients (nitrogen and phosphorus) from point and nonpoint sources into the Lower Chippewa River Basin are degrading surface and groundwater for beneficial uses and threaten natural, diverse aquatic communities.

C. Development: Rural landscape and associated natural communities are being transformed into rural residential area, compromising the biological integrity of the landscape and creating forest fire protection issues. Growth and development of business and industry on urban perimeters encroaches on green space and alters infiltration and drainage patterns, with resulting flood hazards, reduced stream baseflow and water quality impairments.

D. Drinking Water and Groundwater: Agricultural and industrial practices, as well as urban/rural development threaten a high quality and plentiful groundwater resource in the Lower Chippewa Basin

E. Inventory and Monitoring: Efficient and effective resource management depends on knowledge of the current condition of each resource and whether the resource is stable, improving or declining. Basic inventory and monitoring data collection is incomplete and is needed for resource management decisions.

F.Dams: There is a need to reduce the number of streams impacted by aging smaller dams, which no longer serve their original function. Many present safety hazards and cause habitat impairment, including altered temperature regimes, fishery populations and movement, and water quality. Identification of the departmental role in community decision-making is necessary.

G. Education: Changing resource issues and needs in the Lower Chippewa basin require an integrated, dynamic educational strategy to address the public need for resource information. Successful resource management depends on a well-informed public that understands resource problems and potential solutions.

H. Recreation: Access to privately owned lands for outdoor recreation, hunting and fishing is diminishing as land uses change and conflicts develop between recreational user groups. Increased recreational use pressure and conflicts also impact public land management.

I. Staff/Agency Concerns: The need and demand for resource management services is increasing, but available staff and funding have not kept pace. Efficient resource management should include coordination between programs and agencies.

Lower Chippewa River Basin Color Maps

Map 1 - Lower Chippewa River Basin

Map 2 - Surficial Deposits

Map 3 - Historical and Current Vegetative Cover

Map 4 - Public Wells and Wellhead Protection Areas

Map 5 - Chippewa County Well Permits

Map 6 - Wetland Classes

Map 7 - Wastewater Point Sources

Map 8 - Ecological Landscapes

Map 9 - Land Ownership

Chapter 1 - Basin Overview

Introduction

An Integrated Approach to Resource Management

The Wisconsin Department of Natural Resources (WDNR) is integrating its many programs and bringing together multiple agencies, interests and jurisdictions in an "ecosystem approach". All parts of the ecosystem are considered when addressing resource concerns - the land and land uses, surface and groundwater, and the plants, animals and people using it. Historically, natural resource programs tended to focus on single issues. The resource benefits of interaction between program areas were not fully appreciated. In recent years, the WDNR and the public have begun to recognize the importance of dealing with resource issues in the context of their natural and social environment. It is no longer practical to look at single issues without accounting for the whole.

The ecosystem approach maximizes the benefits of comprehensive management. For example, a quality fishery depends upon high-quality surface waters and groundwater. These qualities are conditional on responsible land and water use. Project success is enhanced since the focus is on a variety of objectives, creating complementary project benefits, and gaining broad internal and public support. Additionally, staff and fiscal resources are used more efficiently through integrated planning, implementation and long-term management of the environment (WDNR, 1994).

Purpose of the State of the Basin Report

The State of the Basin Report is the result of a collaborative effort of WDNR staff and the Lower Chippewa Partnership Team that represents the many interests of the citizens of the basin. It provides a vehicle for establishing a consistent process of identifying resource needs, priorities, and joint work plans for meeting those needs. It contains inventory information that "paints a picture" of the current status of natural resources within the basin and identifies the programmatic tools that we currently have available to address resource needs. It identifies the most important resource issues within the basin, and includes goals and objectives for meeting those issues.

It also includes lake and stream tables for each watershed, which contain a great detail of surface water resource information, as well as inventory and management activities and recommendations.

This report was developed locally, within the context of the Department's long-range resource goals. Key documents that were considered include the Department's Mission Statement, Strategic Plan, Strategic Implementation Plan and the Fisheries, Wildlife and Habitat Management Plan for Wisconsin for 2001 through 2007 (FWH).

This report is the first of its kind in this and the other basins of the state. In future years, we will broaden these plans to more fully include other resources, such as forests, prairies, endangered resources and recreation. The original focus partially fulfills federal requirements with respect to fish, wildlife and watersheds. (*Integrated Planning Guidance*, 11/99).

The 1996 Water Quality Management Plan

The Lower Chippewa River Water Quality Management Plan, written in 1996 (WDNR 1996), has been the basis for water resources management priorities and activities for the past five years. It focuses on water quality issues of the Lower Chippewa River basin, evaluates the controls needed for polluted runoff, and provides management and monitoring recommendations for lakes and streams.

The Water Quality Management Plan includes detailed discussions of each of the 23 watersheds within the Lower Chippewa River basin, as well as 30 basin-wide, 10 groundwater and over 250 watershed-specific management recommendations. These components of the 1996 Water Quality Management Plan will continue to be used as a

basis for management decisions. As updated watershed discussions and recommendations are completed, they will supersede the existing ones in the 1996 Water Quality Management Plan. The State of the Basin Report contains the most up-to-date lake and stream tables, and these supersede the tables found in the 1996 Water Quality Management Plan.

Other Resource Management Plans

Resource management planning is undertaken at many levels within the WDNR as well as by other agencies and partners. Several existing management plans have served as valuable resources in shaping this State of the Basin Report. These included:

- State Strategic Plan. WDNR 1999
- Strategic Implementation Plan. WDNR 1999
- Fisheries, Wildlife and Habitat Management Plan for Wisconsin 2001 through 2007 (FWH Plan). WDNR June 2000
- County Land and Water Conservation Plans for counties within the Basin, including Barron, Pepin, St. Croix, Taylor, Eau Claire, Dunn and Pierce counties. (See Appendix 1 - Summary of County Land and Water Conservation Plans)
- Nonpoint Source Program Priority Watershed Plans for priority watershed projects within the basin, including the Hay River, Lower Eau Claire River, Yellow River, Duncan Creek, Lowes Creek and South Fork Hay River.

Additional plans that should be considered when making resource management decisions include:

- Sewer Service Area plans
- Township land use plans
- Masterplans for state properties
- Department of Transportation plans
- Lower Chippewa Natural Area Feasibility Plan
- Western Prairie Habitat Restoration Area Plan
- Lake management plans
- Electrical utilities plans
- "Reversing the Loss", a Strategy for Protecting and Restoring Wetlands in Wisconsin. WDNR, 1999.
- WDNR Strategic Plan for Forestry

The Lower Chippewa River Basin - An Overview

The Lower Chippewa River Basin in the Wisconsin Landscape

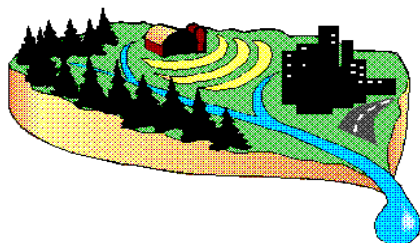


Figure 1 - Watershed Diagram

The Big Picture

What is a watershed?

A watershed is an area of land that drains to a lake, river or stream. Watersheds can be defined on scales ranging from very small to huge. Each small tributary has its own "watershed" which drains to a larger stream, or sometimes, a lake. The watershed of the larger stream includes all the watersheds of its tributary streams. A **basin** consists of the entire tract of land drained by a river and its tributaries, and includes associated lake watersheds as well. Wisconsin is made up of 21 basins based on the

major rivers in the state. The Lower Chippewa River Basin encompasses 15 counties and is divided into 24 watersheds with a total land area of 5,300 square miles. All rivers and streams that drain into the Chippewa River below the Holcombe Flowage dam in northern Chippewa County are included in this basin. Major tributaries include the Eau Claire River and the Red Cedar River. Also, included in this basin are the Rush River, Isabelle Creek, the Trimbell River, and their tributaries, all of which flow into the Mississippi River. See Map 1 - Lower Chippewa River Basin.

Want to know more about watersheds?

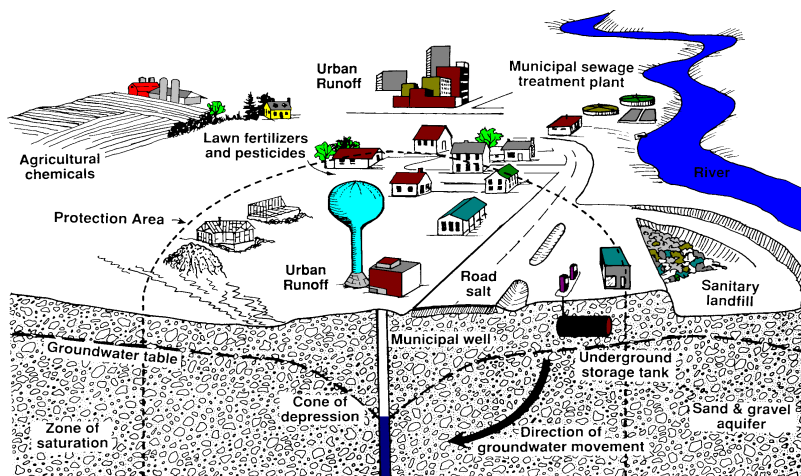
<http://www.dnr.state.wi.us/org/water/wm/education.html>

Check out the EPA's Surf Your Watershed page:

<http://www.epa.gov/surf3/hucs/07050005/index.html>

Figure 2 - Watershed Pollution Sources

Almost all land uses and human activities directly or indirectly affect a watershed in some way. Everything from washing your car to using lawn fertilizers and pesticides, to runoff from cropland and effluent from wastewater treatment plants are examples of actions that may affect a watershed and its resources.



Geology

The Lower Chippewa Basin lies on the west edge of the Wisconsin Dome – a large regional structure that extends across northern Wisconsin. It is composed of Precambrian age igneous and metamorphic crystalline bedrock. The Precambrian surface dips gently to the south, east and west from the dome's highest point in northeast Wisconsin. In the Lower Chippewa Basin the surface of Precambrian igneous and metamorphic crystalline bedrock surface dip in a west to southwest direction at roughly 10 feet per mile (John Tinker, pers. comm.) The Precambrian igneous and metamorphic rocks are age dated at 1.6 billion years before present and older.

Precambrian igneous and metamorphic rock is the surficial bedrock type in the northeastern portion of the Lower Chippewa Basin. The southwestern-most exposures of Precambrian igneous and metamorphic rock are in the

Chippewa River valley at Chippewa Falls and the Eau Claire River valley midway between Fall Creek and Eau Claire (WI Geologic & Natural History Survey 1988). The Precambrian bedrock surface is at elevation 1050 to 1100 feet above sea level in the northeastern portion of the Lower Chippewa Basin and 0-100 feet above sea level in the western edge of the basin in Pepin and Pierce Counties.

Precambrian rocks are overlain by Paleozoic sedimentary bedrock of Cambrian and Ordovician age which were deposited from 523 million years to 468 million years before present. The Paleozoic bedrock is primarily sandstone but does contain dolomite, siltstone and shaley units. The (lowermost) formations are sandstone. Sandstone is absent in the northeastern portion of the Lower Chippewa Basin and gradually becomes thicker to the west and southwest in the basin (WI Geologic & Natural History Survey 1988). The maximum thickness of the lower sandstone is 600 -700 feet and occurs in southeast Pierce County and northwest Buffalo County (Trotta 1983). Up to 150 feet of Ordovician aged Prairie du Chien dolomite overlies the sandstone in central Pierce County and southern St. Croix County. In portions of western Pierce and St. Croix counties, up to 66 feet of Ordovician aged St. Peter Sandstone overlies the Prairie du Chien dolomite.

Glacial Deposits

Much of the Precambrian and Paleozoic bedrock in the Lower Chippewa Basin is covered by unconsolidated sediment of glacial origin. The glacial sediments in the Basin are the result of multiple episodes of continental glaciation. Many examples of the geologic features created by glaciers are preserved in the Chippewa Moraine Unit of the Ice Age National Scientific Reserve located in northern Chippewa County. The property also includes an Interpretive Center (See Appendix 8 - Public Lands in the Lower Chippewa Basin).

Sediment of glacial origin includes material deposited directly by glaciers such as tills (sediments deposited by ice) and end moraines (sediments deposited at the retreating end of a glacier), glacial lake deposits that were deposited when glaciers dammed major drainages and glacial outwash which is material deposited by glacial meltwaters. Some loess (soil of varying proportions of sand, silt, and clay) deposits are associated with glacial activity.

The most extensive glacial-lake deposit in the Lower Chippewa basin consists of interlayered silts and clays in the Chippewa and Red Cedar River valleys that were deposited when the margin of a glacier located in Minnesota and Iowa blocked drainages in western Wisconsin roughly 460,000 – 770,000 years ago. Other less extensive glacial lake deposits exist in the basin as well. An example is the ice-walled lake plains in the Chippewa moraine.

Glacial outwash in the Lower Chippewa basin consists of sand and gravel deposits with very little silt and clay due to the energy of the meltwaters that deposited them. Outwash extends from the Chippewa moraine in northern Chippewa County to the Mississippi River in the Chippewa River valley. Outwash is also present in the Red Cedar valley. Generally the gravel size and content in the outwash decreases as one moves from north to south away from the area of the glacier. See Appendix 8 - Public Lands in the Lower Chippewa Basin.

Groundwater

Groundwater occurs in all of the bedrock and unconsolidated glacier-related deposits in the Lower Chippewa Basin. The volume of water available and the aesthetic quality of the water vary widely across the basin. Generally, the Precambrian igneous and metamorphic crystalline rock produces little water except for fracture zones and at the weathered surface of these rock types. The thick sandstones and outwash deposits in the middle to western portion of the basin can yield large volumes of water for irrigation and potable use. Glacial lake deposits are fine-grained and therefore yield little water to wells. They can serve as an aquitard (a layer of impermeable soil or rock) if extensive enough. The volume of water that glacial tills yield depends on the source area of the till material and the resulting grain size distribution in the till material. Tills with a high clay content produce little or no water and can serve as aquitards. Tills that are primarily sand and gravel with little fine sediment can produce significant quantities of water.

Surface waters

The Lower Chippewa Basin is blessed with an abundance and variety of surface waters ranging from large and small lakes to spring fed cool water streams, meandering warm water creeks, and large rushing rivers. The glacial history, underlying geology and groundwater of the basin all affect the types, quality, and quantity of our surface water resources.

Ice-walled lake plains (evident in the Chippewa Moraine) created small lakes intermingled throughout the forests of Chippewa County. These lake plains were formed at an end moraine of the last glaciation. The underlying bedrock of the basin created the spectacular waterfalls in the Eau Claire River and the basin that underlies Lake Wissota, as well as the meandering streams of the western portion of the basin.

Brief History of the Lower Chippewa River Basin

The Early Period

Prior to European settlement in the Americas, Santee Sioux inhabited much of the area now called the Chippewa River Valley. Eventually the area would become Ojibwa or, "Chippewa". In 1615 French explorer Samuel de Champlain arrived at Lake Huron; he and his men made contact with Ojibwa groups farther west as they explored Lake Superior. During the seventeenth and eighteenth centuries, the French and British established trading posts in Ojibwa country to draw them into the fur trade, exchanging European goods such as guns, metal tools, beads, cloth and alcohol for furs.

The expansion of the Ojibwa into Wisconsin and Minnesota brought them into contact with the Eastern, or Santee Dakota (commonly known as the Sioux). Despite a series of fur trading wars with other tribes, the Ojibwa were generally successful, and began to move inland into Wisconsin, with their first permanent village at Lac Courte Oreilles at the headwaters of the Chippewa River.

Fur traders kept up their lucrative trade until 1754 when the French and Indian War commenced and traders for France were called east to fight the British. The American Revolution further complicated the trade in fur, now carried on by French-Canadians and English fur traders. The Treaty of Versailles ended the American Revolution and British dominion over the land that one day would be Wisconsin.

U. S. Control Begins in Wisconsin

In 1787 the U.S. Congress approved an Ordinance for Lands North West of the Ohio River, affecting public policy for the area now called Wisconsin. The ordinance included landmark public policy for the waterways - highways of commerce and habitat for treasured furs. It said:

*"The navigable waters leading into the Mississippi and St. Lawrence,
and the carrying places between the same shall be common highways,
and forever free, as well to the inhabitants of the said territory, as to
the citizens of the United States..."*

This language, which became part of the Wisconsin Constitution when the state was admitted to the Union in 1848, establishes that all the waters of the state shall be forever held in trust for all the people of the state and nation. By the 1800s the fur economy was in decline and the lumbering economy was starting to rise. The rivers, having served as highways for travel and for the fur trade, would become essential to the logging that would take place during the 19th Century in the pine forests and the Chippewa River basin.

Eau Claire, strategically located at the junction of the Chippewa and Eau Claire rivers, became a busy lumber town. Lumberjacks and mill hands had their homes here, along with businesses, serving the prosperous lumbering industry. Half Moon Lake and Dells Pond were two important timber-holding ponds. The Dells Pond capacity was increased by the construction of a dam in the late 1870's. In 1880 the pond was connected by a log

flume to Half Moon Lake to provide storage space for logs, which fed what might have been the largest concentration of sawmills in the world at that time. These mills gave Eau Claire the nickname of "Saw Dust City."

Figure 3 - Knapp Stout Company



Chippewa Falls and Eau Claire, the two major sawmill towns on the Chippewa River milled most of the pine logs cut in the Chippewa Valley. Soon after the spring thaw, as the logs reached the booms or storage areas near the mills, sawing began.

About 1870 Chippewa Valley lumbermen built flooding dams to more efficiently bring the logs to the mills. The dams held back the water, which could be released as needed when low water was a threat. Millions of logs were floated beyond Eau Claire to the mouth of the Chippewa at Beef Slough where they were formed into rafts and floated or towed to sawmill centers along the Mississippi River. (American Life Histories: Manuscripts from the Federal Writers' Project, 1936-1940)

Despite original visions of an infinite supply of timber, the pinery was depleted in just four decades. By 1910 the great stands of white pine in the Chippewa River territory were, with the exception of two tracts, virtually exhausted. Billions of board feet of lumber had been cut, dragged to the Flambeau River and floated to the Chippewa River and downstream.

Farming Takes Over

Most Chippewa Valley mills closed down in the period between 1891 and 1911. As the lumbering boom faded, Central and Northern Europeans immigrated to Wisconsin. In 1895 the Wisconsin Legislature directed the Dean

of the College of Agriculture at the University of Wisconsin, W. A. Henry, to prepare a handbook for prospective settlers interested in Wisconsin's cut over timber lands. The purpose of the Handbook was to promote the advantages of northern Wisconsin for farming purposes. Henry was clear in his objective. It was to help in "...bringing to us an intelligent, worthy class of people who are posted in advance on the kind of country they are coming to and who, knowing this, are not likely to leave us disappointed...".

In the Chippewa Valley and like areas, timothy hay was the recommended crop. "When a piece of land has been 'chopped off' and the brush and logs removed, the stumps are too thick for the cultivation of crops requiring annual plowing of the soil and frequent cultivation. The dairy industry also will be rewarding in the future for Wisconsin settlers, with cheese and butter benefiting from the fine water supplies," Henry said. But he warned settlers not to be overly optimistic.

"First of all, let it be distinctly understood that clearing up and farming a wooded country is an undertaking requiring much hard labor extending over a period of years; the amount of material in the shape of trees, living and dead, together with the brush, stumps and undergrowth, is often sufficient to make one's heart grow faint...."

There were plenty of settlers who were not faint of heart. In 1910 there were 13,820 farms in Barron, Chippewa, Eau Claire, Dunn, Rusk, Buffalo and Pepin counties. By 1930 there were 18,978 farms (Figures 5 and 6).

Energy and Industry

In the late 1800's and early 1900's the rivers, once a highway for fur traders and then dammed for the transport of white pine timber from the northland, were put to another use. They were harnessed to produce power for industry in the growing settlements along the Chippewa, Red Cedar, and Flambeau rivers. The Chippewa River drops nearly 700 feet in elevation along its length, providing opportunities for hydroelectric generation.

In 1882, the City of Eau Claire installed an electric generator at the original logging dam at Dells Pond. In 1924, the present dam was completed just downstream. The Wissota hydropower dam was completed in 1918 by over 700 workers who lived in a small town built at the site. When the project was flooded, it created the 6,300-acre Lake Wissota at the confluence of Paint Creek and the Chippewa and Yellow Rivers. The Chippewa Falls hydropower dam was completed in 1928 at the site of an old lumber mill. The Jim Falls hydropower project, originally completed in 1922, was redeveloped in the mid-1980's making it the largest hydropower facility in Wisconsin (57,000 kilowatts).

The original Cedar Falls timber dam was replaced with a concrete structure in 1910, with new generators added in 1912 and 1915. Since then, the plant has operated largely unchanged. The dam created Tainter Lake, an 1800-acre flowage formed by the impoundment of the Red Cedar and Hay Rivers. A short distance downstream, the original Menomonie Dam was constructed in 1848 and subsequently equipped with electric generation equipment in 1907. The dam was raised by 12 feet in 1950 after being damaged by floodwaters and created the present day 1,400-acre impoundment known as Lake Menomin.

Xcel Energy (formerly Northern States Power Company) has generating facilities at Holcome, Cornell, Jim Falls, Chippewa Falls, Wissota and Dells. The combined capacity of the power plants is 188,900 kilowatts which represents over one-third of the hydro capacity in the State. Two hydropower plants, the Cedar Falls and Menomonie Hydros, are located on the Red Cedar River which joins the Chippewa River about 20 miles southwest of Eau Claire.

The major population centers in the Lower Chippewa River Basin, including the cities of Chippewa Falls, Eau Claire, Menomonie and Rice Lake, are all located on rivers.

The Lower Chippewa River Basin Today

Vegetation Changes

The dramatic loss of the forests in the logging days of the late 1800's is evident even today. When comparing maps of vegetative cover from the mid-1800's with land cover and land use in the late 1970's and early 1980's we see a dramatic shift in vegetation types (See Map 3, Historical and Current Vegetative Cover). Forested lands, which historically covered over 90% of the basin, now cover less than 50%. Native grasslands covered almost 10% of the basin, but have now been almost fully converted to agricultural lands. Currently agricultural lands cover over 40% of the basin.

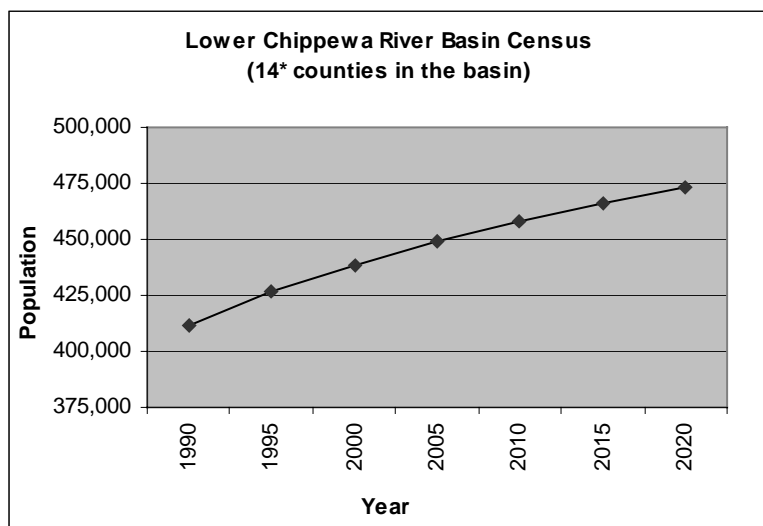
Population Changes

The projected population in the basin for the 2000 census is 438,567 people. Statewide the projected population is 5,287,825. Projections estimate the population in the basin to reach 475,000 by the year 2020 (State of Wisconsin DOA webpage). Along with an increased population in the basin, comes greater pressure on our environment, reducing the number of undeveloped areas and fragmenting existing tracts of land.

Want to know more about populations?

http://www.doa.state.wi.us/dhir/boir/demographic/pop_proj.asp

Figure 4 - Population Projections



*Counties used to calculate the increase in population in the basin:

Barron	Pierce
Buffalo	Polk
Chippewa	Rusk
Clark	Sawyer
Dunn	St. Croix
Eau Claire	Taylor
Pepin	Washburn

Agricultural Changes

Agricultural statistics are available on a county-by-county basis. In this section, data from the following counties were included: Barron, Rusk,

Chippewa, Dunn, Eau Claire, Buffalo and Pepin. The number of acres of farmland reached a peak in the 1920's and 1930's, topping out at over 2.4 million acres. In the 1980's and 1990's, that number had declined from 2.2 million to 2.0 million acres, approximately a 9% decrease.

Want to know more about changes in agriculture?

<http://www.farmland.org>

<http://www.nass.usda.gov/census/census97/highlights/wi/wi.htm>

The number of farms in these counties reached 18,978 in the mid-1930's. Between the late 1970's and 1998, the number of farms declined from 10,370 to 8,590, a decrease of approximately 17%. (Statistical Reporting Service of the WDATCP/USDA)

Figure 5 - Number of Farms in 7 Counties

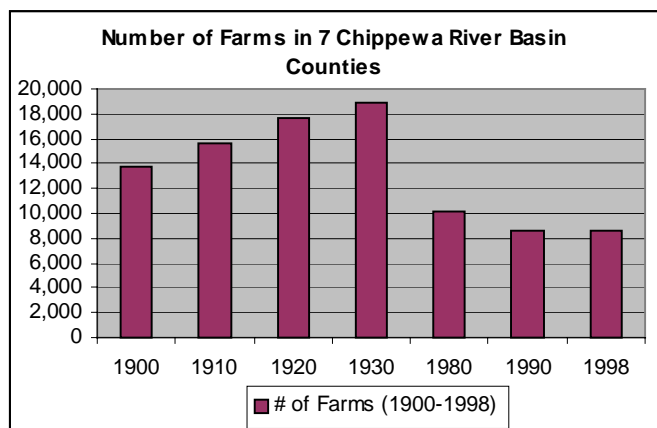
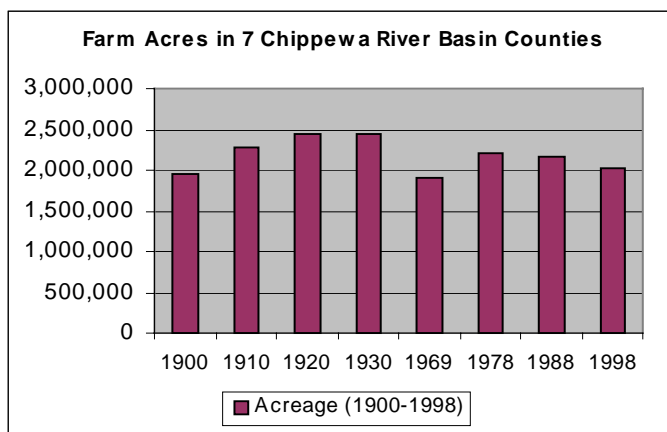


Figure 6 - Number of Farm Acres in 7 Counties



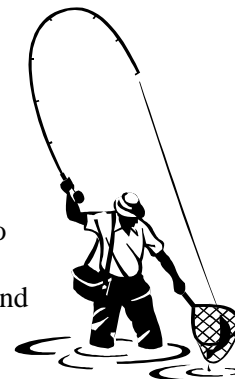
Urban and Rural Land Development

Rapid urban and rural residential land development is common in the Lower Chippewa River Basin. Between 1960 and 1999, the City of Eau Claire grew from almost 38,000 to nearly 63,000. The number of housing units more than doubled, from over 12,000 to almost 25,000. The land area covered by the city went from 19.3 square miles to over 32 square miles (City of Eau Claire Planning Division). Many historically rural townships surrounding urban areas are experiencing rapid growth of rural residential homes and subdivisions, putting pressure on local governments for increased support services, such as fire protection and road maintenance.

Land uses and the social fabric of rural communities is changing from an agricultural base to rural residential, creating challenging planning issues for local units of government.

Impacts to Lakes and Stream Resources

Population growth in the Basin has created intense development pressure along lakes, rivers and streams. In some areas, most of the available shoreland frontage has been developed. Many counties within the state have taken steps to protect sensitive shoreland habitat and surface water quality through a process of classifying water bodies according to their protection needs, and county ordinances have been updated to reflect these needs. Within the Lower Chippewa Basin, Chippewa County is undertaking Lake Classification and drafting associated ordinances. Barron County completed lakes classification in November, 2000.



Along with a robust economy comes added pressure to use our resources for recreational purposes. Increased recreation often creates conflicts between users and the environment as well as between different recreational groups. On a summer weekend on Lake Holcombe or Wissota, water-skiers and anglers may find themselves competing for use of the same water resource. On some lakes, turbulence created by outboard motors disturbs shallow aquatic plant beds, harming important fish spawning areas. Many area lake associations and protection groups work diligently to find and support solutions to these conflicts.

Additional pressure is also put on groundwater with increased development. The Basin relies on groundwater for domestic, commercial, agricultural and industrial use. Development also leads to a decrease in permeable areas needed for replenishing groundwater to the basin. If groundwater is not replenished or recharged, it can cause a decrease in stream baseflow and degradation of fisheries.

The Lower Chippewa River Basin Tomorrow

Creating a Sense of Place and Stewardship

Education

The UW-Extension is leading an interagency commitment to citizen-based watershed programs. Basin Educator positions support a statewide educational network administered along river basin lines. In the Lower Chippewa Basin, the Basin Educator has assisted in the formation of the Lower Chippewa Basin Partner Team. This has increased the opportunity for discussion and sharing of ideas concerning the natural resources within the Lower Chippewa River Basin. Members of the Partner Team have the opportunity to identify critical resource issues in the basin, recommend management projects and/or solutions, and suggest common implementation plans to address those issues. A goal of the Basin Partnership Initiative is to increase the coordination among partners as they work together towards addressing common resource management priorities in the Lower Chippewa River Basin.

The WDNR has also developed a wide array of educational materials and initiatives for the public, and support services for teachers. Through *EE News*, a publication produced quarterly by the WDNR, teachers can keep up-to-date on what's happening in the environmental education field in Wisconsin, learn more about natural resources in Wisconsin, receive activities to help them teach their students about the environment, and find out about workshop opportunities.

EEK! Environmental Education for Kids!, an electronic magazine for kids in grades 4-8, is a web site produced by the WDNR. It provides current and accurate information on natural resources, along with career information. It offers students the opportunity to take part in activities, make seasonal observations, and share stories and artwork.

Want to know more about educational opportunities?

<http://clean-water.uwex.edu/>

<http://www.dnr.state.wi.us/org/caer/ce/bureau/education/education.htm>

<http://www.dnr.state.wi.us/org/caer/ce/eeek/>

Understanding local resources - Half Moon Lake

Half Moon Lake, an oxbow of the Chippewa River, has been the subject of intense management and study for the past 25 years. The lake was used as a log holding area for several sawmills in the late 1800's and early 1900's, leaving huge amounts of organic and nutrient pollutants in the sediment of the lake. Stormwater discharges from the City of Eau Claire contributed additional pollutants until the early 1980's, when most stormwater was rerouted to the Chippewa River. The City installed and operates high capacity wells near the Chippewa River to bring water to Half Moon Lake to maintain its water levels.

Frequent algal blooms have historically plagued the lake. The city initiated an extensive aquatic plant-harvesting program in the late 1980's, which has alleviated some of the nuisance aquatic plant and algae conditions. Several studies were conducted on the lake throughout the 1990's, including an extensive water quality and watershed assessment in 1999. Results show that nutrients, from the watershed, in the lake bottom sediments and the aquatic plants continue to be a major contributor of excessive phosphorus, a nutrient that causes nuisance algae and plant growth. Local water ski team practices and shows contribute to the problem by mixing stratified water layers in the lake during the summer. This mixing action promotes unwanted algae growth.

The water quality study documented extremely high levels of algae growth, and found that water quality standards were exceeded in the lake for dissolved oxygen and pH during the summer growing season. The study concluded that if the amounts of phosphorus reaching the lake are reduced, algae levels can be expected to decrease and

water clarity will improve. The next step in managing Half Moon Lake will be to establish goals for lake water quality, and a specific plan for reducing the amount of nutrients reaching the lake.

Community leaders, students and citizens have participated in studying Half Moon Lake and its watershed. They realize the sense of place that the lake provides to the people of Eau Claire and surrounding communities and therefore understand the need to protect it.

Understanding Local Resources - Duncan Creek Water Quality Monitoring Project

The Duncan Creek Stream Quality Monitoring Project is a collaborative effort of three of the four high schools in the Duncan Creek watershed, the Chippewa County Land Conservation Department, the WDNR and the UW-Extension.

Samples are collected in the spring and the fall each year at approximately 13 sampling sites on Duncan Creek and its tributaries. Samples are tested for a variety of physical, biological and chemical parameters to measure water quality. Students do all of the sampling at the sites selected by their school. Data has been collected since 1996.

The key reason for developing a high school stream quality monitoring effort was to raise awareness for environmental stewardship among future decision-makers. The local citizen advisory group believes that this is a critical component of long term protection and preservation of our streams. Further, the group contends that collecting and analyzing data at local stream sites and collaborating with others in the watershed will increase students understanding and connection to their local resources and will develop a more concerned and knowledgeable citizenry.

Empowering People with Tools Needed to Make a Difference

Resource protection can often be accomplished when citizens learn new techniques and approaches to accomplishing familiar tasks. Stormwater quality improvement has resulted from UW-Extension education programs. After special training, youth groups have stenciled storm drains with the phrase "Dump no waste - drains to lake or river". Coupled with the distribution of educational materials, citizens have changed how they dispose of waste oil, soapy water from washing cars and excess fertilizer from lawns.

The WDNR has developed a shoreland vegetation restoration and management demonstration project at Lake Wissota State Park. Several techniques for restoring native vegetation along shorelines are being tested. Brochures, presentations and educational signs at the site are promoting these new shoreland stewardship techniques to many citizens.

Want to know more about shoreland restoration projects?

<http://www.wnrmag.com/stories/2000/apr00/shore.htm>

Making Sound Land Use Decisions

Lower Chippewa State Natural Area

The Lower Chippewa River State Natural Area feasibility study identified 125 species listed as endangered, threatened or special concern. The project area is also known to contain 25% of the total native prairie lands in the state. This is the largest concentration of rare species in any area of comparable size in the state. Here are just a few of the endangered and threatened species:

Want to know more about the Lower Chippewa State Natural Area?

<http://www.dnr.state.wi.us/org/gmu/lowerchip/index.htm>

Endangered Species

Pecatonica Mayfly* (federally)
Higgin's-eye Pearly Mussel (federally)
Dotted Blazing Star
Loggerhead Shrike
American Peregrine Falcon

Threatened Species

Wing Snaggletooth Snail
Cerulean Warbler
Yellowish Gentian
Paddlefish
Eastern Massasauga

(WDNR-Feasibility Study 1999)

*This is one of only three known populations in the world for the Pecatonica River mayfly

In recognition of these unique natural resources, the Natural Resources Board and the Governor approved the establishment of the Lower Chippewa River State Natural Area, extending from Eau Claire to Nelson along the Chippewa and Red Cedar Rivers. The goal of the project is to preserve and protect the most unique and sensitive areas with outright acquisition, easements or voluntary management. The biological diversity remaining in the area is a testament to the land stewardship that has been a tradition for generations. As land changes hands, this project will help assure that this land stewardship continues on select sites.

Conservation Buffer Project

A buffer is a strip of land in permanent vegetation. Buffers serve many purposes including trapping sediment by slowing runoff, thereby minimizing the chances of fertilizers, pesticides, and excess nutrients reaching surface water. Sediment from the Chippewa River continues to fill the river backwaters of the Upper Mississippi River Wildlife Refuge. This has led to a decline of wetland vegetation on the Refuge. Fish and wildlife dependent upon these plant beds for food and shelter have suffered accordingly. Buffers would reduce the amount of sediment reaching these delicate backwaters, by minimizing the amount of sediment coming into tributary streams. Buffers also provide a natural habitat for wildlife, improve fish habitat, and increase the diversity of native vegetation. Currently, 60% of the basin is in cropland and pasture. The pre-settlement prairie component was 13%. Today, however, it comprises less than 1% of the basin. Installing buffers alongside stream corridors would increase the amount of native prairie grasses in the basin, while benefiting wildlife as well.

The Lower Chippewa Conservation Buffer Project is a grassroots effort to encourage buffer establishment along sensitive streambanks in the basin. With grants from supporting agencies and donations from conservation clubs and organizations, the Lower Chippewa River Basin Partnership Team proposes to hire a Conservation Buffer Specialist in 2001. The Specialist will train and coordinate a large cadre of volunteers to promote installation of conservation buffer strips within the basin utilizing the Conservation Reserve Program (CRP).

Volunteers will have the opportunity to work one-on-one with property owners who have lands eligible for buffer establishment, in addition to distributing educational brochures, assisting local conservation agencies, and monitoring water quality and habitat of the targeted areas. Landowners will be encouraged to enroll the buffers in such programs as the USDA's continuous Conservation Reserve Program (CRP). The Specialist will coordinate with USDA's Natural Resources Conservation Service (NRCS), the Farm Service Agency (FSA), and County Land Conservation Departments (LCD).

Conservation buffer strips are a low-cost addition to a farmer's toolbox for managing on-farm nutrients. Farmers can diversify and in some cases increase the farm income by enrolling the buffer areas into programs such as the Conservation Reserve Program (CRP). In the next ten years, the project will potentially generate an additional \$1,950,000 in cost share and rental payments for area farmers from CRP. (Herdrich/Beaster 2000)

Smart Growth Initiative

The Smart Growth Initiative provides communities with the framework for developing comprehensive plans that have a

Want to know more about community planning?

<http://www.smartgrowth.org/index2.html>

<http://www.smartgrowthamerica.com/>

http://www.1000friendsofwisconsin.com/smartgrowth/sg_intro.shtml

connection between development and quality of life. The comprehensive plan will improve a community's ability to guide future development in ways that promote interrelationships between various facets of a community. By January 1, 2010, all communities which make land use decisions will need to make those decisions based on an adopted comprehensive plan. Elements of the plan include: issues and opportunities, housing, transportation, utilities & community facilities, natural & cultural resources, economic development, intergovernmental cooperation, land use, and implementation. See Appendix 2: Goals of the Smart Growth Program. The Smart Growth program provides funding to communities in the process of creating a plan and also funding to those communities that have a current acceptable plan in place.

State Agency Involvement - Each state agency, including the DNR, is encouraged to design state programs, policies, and investments in ways that respect the efforts of local governments. The law specifically asks us to balance our mission with a number of local planning goals. It also requires us to ensure that plans submitted as part of programs we administer comply with the comprehensive plan definition and help achieve the specified local planning goals (Intranet website & Smart Growth Network website). The DNR could also assist through providing essential maps and map layers such as wetlands, hydrologic layers, and other GIS data.

Dam Removal/Restoration

Since the early 1880's 18 Mile Creek had been dammed at the Village of Colfax in eastern Dunn County. The dam, standing 13 feet tall and 75 feet wide, was originally built to power a mill for grinding grain. Over the years it washed out and was rebuilt several times. As sedimentation increased in the impoundment, the once cold-water stream was converted to a warm water fishery, with increased water temperatures, low dissolved oxygen levels and excessive silt. The impoundment prevented upstream migration of native fish species and created poor habitat for the coldwater fish community.

Want to know more about dam removal?
<http://www.wisconsinrivers.org>

The cost to repair and dredge the impoundment was estimated at \$1 million, while actual removal costs were \$202,000. Residents of Colfax voted to remove the dam and in 1997 the impoundment was drained. During the winter of 1997-1998 the dam was removed. The stream channel was stabilized by removing sediment, which in turn protected the Red Cedar River and Tainter Lake from adverse effects. Local DNR staff, Colfax High School students, and Trout Unlimited members reseeded the exposed lake bed and installed habitat structures.

The project was a collaborative effort between the DNR, the Village of Colfax, Dunn County Land Conservation Department, and local conservation organizations including Trout Unlimited. With the help of local groups, 3,200 feet of trout habitat in the Village of Colfax was eventually restored. (River Alliance/WDNR webpages)

Figure 8 - 18 Mile Creek - Before Restoration



Figure 7 - 18 Mile Creek - After Restoration



Wellhead Protection

One way to promote safe drinking water is to protect the area around municipal water supply wells from sources of contamination. The Wellhead Protection (WHP) Program allows municipalities to restrict land use around public water supply wells. Wisconsin's WHP program requires that wells proposed after May 1, 1992 have Wellhead Protection Plans. For older wells the program is voluntary. Wellhead protection delineations for all municipal wells in the state have been completed.

The DNR Source Water Assessment Program identifies land areas that contribute water to public wells, conducts inventories of potential contaminant sources, and determines the susceptibility for each public water supply - surface or groundwater. The assessment will assist water system operators in preparing WHP plans.

Wisconsin's Land Legacy

The Department is conducting a study to assess the state's land ownership needs in order to adequately protect Wisconsin's critical land and water resources and to provide satisfying

outdoor recreation opportunities for future generations. This study is intended to identify areas of the state that should be considered for some form of protection over the next 50 years.

Interested in the Land Legacy Program?

http://www.dnr.state.wi.us/master_planning/land_legacy/index.html

This study is being conducted in two phases. The first phase of the study has been focused on developing criteria that address important characteristics of conservation and recreation lands. The second phase of the study will identify areas of the state that most effectively meet these criteria. The criteria will be applied using both objective (based on existing data, primarily in GIS form) and subjective (based on the personal knowledge of Department staff and the public) approaches. A public meeting is scheduled for February 28, 2001 to solicit this public input. The plan is expected to be presented to the Natural Resources Board in the fall of 2001. The Department expects to seek approval from the Natural Resources Board (NRB), over a period of time, to conduct feasibility studies on selected sites.

Areas of the LC Basin that are identified in the Land Legacy Report will be included in future updates of the State of the Basin Report.

Chapter 2 - Land and Water Resource Management Programs

The Foundation for Setting Management Policy

Wisconsin's Natural Resources Management History

When the Northwest Ordinance of 1787 created the Wisconsin territory, it decreed that our waterways be “common highways and forever free.” Our waters are held in trust by the state government for all citizens. In the early days, the Public Trust Doctrine was important because our waterways were highways of commerce for the early explorers, then trappers and traders, and later for the lumber industry.

European settlement of Wisconsin from the mid-1800s onward drastically changed the Wisconsin landscape. Mining, logging, farming and development all contributed to a sharp decline in fisheries and wildlife, and loss of forests. Trading, logging, milling, transportation, electric power generation, irrigation, waste disposal, manufacturing, domestic water supply, and recreational uses all strained the state's lakes and rivers, and led to conflicts among water users.

Public sentiment fueled support for state government to protect and manage the state's natural resources. In 1907, the first state parks board was established, with authority to buy and manage land for park purposes. In 1919 the legislature passed Chapter 144 of the statutes, which incorporates state supervision over public water supplies. In the mid 1920's, the state appropriated money for buying, preserving and developing forests, and passed a law permitting the establishment of national forests in Wisconsin.

Beginning around the 1930's, the Public Trust Doctrine was used to preserve the cleanliness of our waters, as well as scenic beauty. In addition, a series of laws were passed to protect private wells and home water supplies, increasing the safety of drinking water. Several soil conservation programs also began at this time.

The 1937 Pittman-Robertson Federal Aid in Wildlife Restoration Act and the 1950 Federal Dingell-Johnson Bill established taxes on sales of sporting equipment and tackle to be used for fisheries and wildlife programs. The two acts have been amended over the years to include taxes on archery equipment, certain boat motors, and gas used for boats.

In 1960, the Wisconsin Legislature enacted a long-range program of acquisition and improvement of state recreational facilities, known as the Outdoor Recreation Action Program or ORAP. This prompted a wave of new park purchases, maintenance projects, and the era of rails-to-trails developments.

Department of Natural Resources Created

The legislature created the Department of Natural Resources in 1967, allowing a comprehensive approach to managing complex environmental problems. Conservation, recreation, wastewater and drinking water protection functions were merged under one agency, allowing staff to apply more cohesive, thorough strategies to reduce air pollution and hazardous wastes, protect groundwater, provide drinking water, encourage waste reduction and recycling, protect non-game and endangered species, and acquire lands for public use.

Environmental Laws of the 1970's, 1980's and 1990's

The DNR assumed further responsibilities as the federal government passed national environmental laws

in the 1970s, '80s and '90s. The State Endangered Species Act was passed in 1971 to protect endangered plant and animal species and to establish a program for conserving and restoring these species. The Federal Endangered Species Act followed in 1977. In 1972 Congress passed the Water Pollution Control Act, giving environmental protection a strong legal basis. It became a felony to discharge wastes to the waters of the United States without a permit. By 1974 the state had a working water pollution control program with penalties. Federal and state grants paid more than half of the cost of new municipal sewage treatment plants, and hundreds of millions of matching grant dollars were paid out.

Also in 1972, the Wisconsin Environmental Policy Act passed requiring state agencies to consider the environmental effects of their actions. It established the principle that broad citizen participation should be part of environmental decision making.

In 1974, Congress passed the Safe Drinking Water Act. The act set federal standards for drinking water quality and required the states to assure compliance with those standards. Wisconsin was one of the first states to have its own federally approved drinking water program, and in 1984 became the first state to pass a comprehensive groundwater law to protect the aquifers that supply three-quarters of all Wisconsin residents with their drinking water.

Wisconsin's Nonpoint Source Pollution Program was created in 1977 to protect our waters from runoff pollution by offering to share costs with landowners and communities that take steps to keep soil, fertilizer, street debris and construction site dirt from washing into streams and lakes. Nonpoint source pollution is now considered to be the state's greatest water quality concern, degrading or threatening about 40 percent of the streams, about 90 percent of inland lakes, many of the Great Lakes harbors and coastal waters, and a substantial portion of groundwater resources in the state.

In 1989 the Knowles-Nelson Stewardship Program was established and authorized to issue up to \$250 million in state bonds to buy and develop land for recreational uses, wildlife habitats, fisheries and natural areas. The Program was reauthorized in 1999 for 10 years and allowed issuing \$46 million in state bonds to buy recreational and other valuable conservation lands and pay for recreational improvements.

The Department of Natural Resources Today

The reorganization of the Department of Natural Resources in 1996 accomplished a restructuring of the agency to optimize efficiency and effectiveness, and improve integration of DNR programs to better

serve customers and environmental protection. Residents of the state have input into the agency through basin partner teams, to set local priorities for natural resource management.

Want to know more about the Department?

<http://www.dnr.state.wi.us/org/caer/ce/news/on/on991220.htm>

<http://www.wnrmag.com/supps/1997/dec97/dec97.htm>

A strategic plan for the agency was recently adopted. It emphasizes ecosystem management, increasing reliance on partnerships to accomplish natural resources goals, protecting public health and safety, and providing for outdoor recreational opportunities today and in the future.

The plan Vision states:

We share responsibility as natural resources stewards with Wisconsin's citizens, government, businesses and visitors. We recognize that air, land and water are interconnected in sustaining all life, in protecting public health and in achieving healthy ecosystems and the sustainable economies that depend on these ecosystems. We recognize that forestry, farming and nature-based recreation – like hunting, fishing and trapping – are key to the state's economy and quality of life. We value our dedicated staff and provide them with the tools and training needed to ensure that Wisconsin has the best-managed natural resources in the world.

The Department of Natural Resource's duties today reflect the laws Wisconsin citizens sought over decades to protect the state's natural resources while allowing the economy to flourish. The Department balances conflicting uses today so quality natural resources are available tomorrow. The Department's authority comes from decisions of the Legislature, Governor's office, the Natural Resources Board, the courts and agreements with federal agencies. Tax revenue and user fees support DNR programs.

Department Presence in the Basin - Staff

About two-thirds of the Lower Chippewa River Basin is located in the Department's West Central Region, and the remainder is in the Northern Region (Map 1). Together, approximately 120 permanent employees in the Land and Water Programs have part or all of their job responsibilities within the Lower Chippewa River Basin. Of these, approximately 50 work primarily within the Lower Chippewa River Basin.

Of about 50 Water Program staff, 26 work primarily within the Lower Chippewa River Basin, and of approximately 70 Land Program staff, about 29 work primarily within the Lower Chippewa River Basin.

Table 1. DNR Land and Water Program Staff Working Primarily in the Lower Chippewa Basin.

Water Program Areas	Approximate Staff
Drinking Water and Groundwater (Water Supply)	5
Wastewater	5
Lakes Management	1
Rivers Management	1
Fisheries Management	5
Runoff Management	2
Water Resources Engineer	2
Water Regulation and Zoning	1
Supervisory	2
Other	2
Total	26
Land Program Areas	
Forestry	13
Real Estate	1
Wildlife	4
Parks & Trails	6
Forest Entomologist	1
Urban Forester	1
Supervisory	3
Total	29

The remaining Land and Water Program staffs have job responsibilities that extend beyond the boundaries of the Lower Chippewa Basin. Sixteen provide regional leadership, or serve as regional experts in drinking water, fisheries, watersheds and wetlands, forestry, wildlife, master planning or fire management. Approximately 20 water program employees have job

Want to reach WDNR staff?

<http://www.dnr.state.wi.us/aboutdnr/personnel/>

responsibilities in the programs listed above, but work in several basins. Approximately 45 land program employees have job responsibilities in the programs listed above, but work in several basins. Many employees have mandated responsibilities under different Wisconsin or federal laws. For example: Drinking Water and Groundwater staff are responsible for implementing the Safe Drinking Water Act.

Most employees who work primarily in the Lower Chippewa Basin are located at the West Central Region Headquarters in Eau Claire. Other staff in the West Central Region are located at Chippewa Falls, Baldwin, Cornell, Durand, Ellsworth, Fairchild, Lake Wissota State Park, Brunet Island State Park and Menomonie. Offices that serve the Lower Chippewa Basin in the Northern Region include Spooner, Barron, Hayward, Park Falls, Cumberland and Rhinelander.

Water Management Programs

Fisheries Management and Habitat Protection Program

The Fisheries Management and Habitat Protection Program protects and improves lakes and rivers in the Lower Chippewa Basin and statewide. The program manages Wisconsin's sport,

Want to know more about lakes and rivers?

<http://www.dnr.state.wi.us/org/water/fhp/>

<http://www.dnr.state.wi.us/org/water/fhp/rivers/index.htm>

<http://www.wnrmag.com/stories/2000/apr00/shore.htm>

commercial and non-game fisheries and aquatic habitats, monitors water quality, and provides numerous grant programs. As part of the Fisheries Management and Habitat Protection Program, the Lake Management Program protects and maintains Wisconsin's 15,000 inland lakes to provide a full complement of lake uses for all citizens. This program is a cooperative effort of the University of Wisconsin - Extension, local units of government, lake districts and associations, and lake-specific conservation and community groups. It helps coordinate action of the many WDNR programs that affect lakes. A major goal is ensuring that an adequate water quality database exists to support current and future management programs.

Fisheries Monitoring and Management Programs

WDNR fisheries staff evaluate fish populations on lakes, flowages, rivers and streams. These evaluations include an assessment of fish community health, fish length, sex and age distributions, assessment of the impacts of stocking, habitat improvement and various regulations. This information is critical for sustaining good fishing and fish populations. Each year fisheries staff review and recommend stocking quotas and fishing regulation revisions for basin lakes and flowages, rivers and streams. They work with farmers, landowners, angling groups, lake associations and others to protect and restore aquatic and shoreline habitat, reduce bank erosion, improve trout habitat, and restore riverine environments through dam removal. Fisheries Biologists and technicians provide information to the public on a daily basis. In addition, they team up with teachers and conservation organizations to loan equipment and introduce environmental and angling educational opportunities to the students and the public.

Surface Water Monitoring Programs

Rivers and Streams: Currently, a variety of surface water monitoring approaches are implemented on streams and rivers in the basin. These include comprehensive stream surveys, surface water use classifications, complaint investigations, stream trend monitoring, toxics monitoring and special studies. The Chippewa River at Holcombe, Chippewa Falls, and Durand and the Red Cedar River at Menomonie are monitored monthly to provide information on trends in water quality. A statewide water quality trend monitoring network for large rivers will be initiated in 2001.

A new statewide "baseline" biological monitoring program was initiated in 1999. This program is intended to provide adequate water resource information to assess the current condition or status of the waterbody, whether it is meeting its potential biological use and if not, what factors are preventing the use

from being attained. Baseline monitoring has been initiated in lakes, wadeable streams and nonwadeable streams. Wadeable stream monitoring includes fish surveys (game and non-game species), macroinvertebrates (aquatic insects), water chemistry, streamflow measurements and habitat assessments. During 1999, wadeable stream surveys were conducted at approximately 100 sites in the Bear Creek and Plum Creek watersheds in the Lower Chippewa Basin. During 2000, wadeable stream baseline monitoring was conducted in the Lower Chippewa River tributaries downstream of Eau Claire, the Lowes Creek watershed, and the Rush River watershed. Nonwadeable stream monitoring includes fish surveys, macroinvertebrate and water chemistry sampling, and habitat assessments. Surveys were conducted at two sites in the St. Croix River (reference sites) below St. Croix Falls and 3 sites in the Red Cedar River below Menomonie during 1999. Additional sites were surveyed in the Lower Chippewa River below Eau Claire in 2000.

As part of the toxics monitoring program, fish samples are collected during monitoring activities on lakes, nonwadable or wadable streams, and tested for the presence of polychlorinated biphenyls (PCB's) or mercury. These samples are sent to Madison for processing.

Lakes: Lake monitoring includes several strategies to assess lake conditions in the basin. The WDNR is currently developing statewide strategies to assess the status and trends of lake ecosystem health. The goal of this effort is to assess all lakes greater than 100 acres in size that also have public access. Publicly accessible lakes that are less than 100 acres in size will also be assessed, but at a lower level of intensity.

Monitoring may include biological and physical conditions and water chemistry. Aquatic plants, fish, bottom-dwelling invertebrates, land use practices in the watershed, weather, and physical setting and historical data are collected. Within the Lower Chippewa Basin, Tainter Lake in Dunn County and Axehandle Lake in Chippewa County are monitored for long-term trends.

The WDNR also supports lake ecosystem assessment monitoring to evaluate specific lake management concerns. Several lakes and watersheds have been evaluated in the basin to assess specific management problems, including excessive nutrient inputs, winterkill conditions, aquatic plant management and shoreland development.

The Self-Help Monitoring Program allows citizens to assist the DNR with basic lake data collection, and to take an active role in lake management activities. Self-help volunteers are trained by a WDNR lake management specialist to measure water clarity, and conduct other monitoring on some lakes. Volunteer monitors are active on 65 lakes within the Lower Chippewa Basin.

Aquatic Plant Management Program

This program regulates the use of chemical treatments to abate nuisances caused by excessive aquatic plant growth. The objective of the permit procedure is to preserve the ecological benefits of lake plant communities, including fish and wildlife habitat, erosion prevention, and water quality maintenance. The program also promotes alternative methods of control and appreciation of the benefits of aquatic plants. Quantitative aquatic plant surveys provide information that is used for fish habitat improvement, protection of sensitive wildlife areas, aquatic plant management, and water resource regulations.

Rivers and Streams Planning and Protection Grant Program

In 1999, the legislature established the Rivers and Streams Planning and Protection Grant Program. Local units of government, qualified river management associations and non-profit conservation organizations can apply for state grant funds for planning, protection and restoration activities on rivers and streams. The Rivers Program assists local organizations by providing information on riverine ecosystems, improving river assessment and planning, and promoting local understanding of the causes of river problems. Activities that may receive funding include conservation easements, land acquisition, local regulations and ordinance development, pollution control practices, stream or shoreland habitat

restoration, educational and monitoring activities. The new Rivers Program is an excellent opportunity for qualified groups to get assistance in helping to protect, preserve or restore river and stream systems.

Wisconsin Lakes Partnership Program

The Wisconsin Lakes Partnership Program helps ensure healthy and diverse lake ecosystems while considering the needs of society. Partnership priorities include adopt-a-lake and youth and adult education, aquatic plant management and protection, lake leadership training, lake organizational and technical assistance, lake planning and lake protection and classification grants, recreational boating aids and boating safety, self-help citizen lake monitoring, shoreland and water regulation and zoning, and wetland and watershed management.

Three groups form the core of this partnership. The Department of Natural Resources supplies technical and financial assistance and regulatory authority. The University of Wisconsin Extension builds linkages between stakeholders and provides educational materials and programs. The Wisconsin Association of Lakes (WAL) provides a united voice for lake organizations around the state and plays a vital role in all areas of partnership activities. Lake organizations, property owners, and local governments provide the political will and hard work to accomplish watershed restoration and lake protection.

The Lakes Partnership Program also acts as liaison with the U.S. Environmental Protection Agency (EPA) for the federal Clean Lake Grant Program. Cost-sharing grants support the planning and implementation of lake protection and restoration projects. Regional Water Team staffs apply to the EPA for grants on behalf of local project sponsors each year, and help administer successful grants.

Lake Planning and Protection Grants (NR 190 and NR 191)

Lake districts, lake associations, tribes, counties, cities, villages, or towns can apply for *Lake Planning Grants* to fund the collection of information on the quality of water in lakes, delineation of watershed boundaries, land use inventories, or studies of local zoning and shoreland regulations. Projects chosen may be awarded up to \$10,000 with a 25 percent local cost share. Lake Protection Grants fund implementation of lake protection and restoration projects. *Lake Protection Grants* provide 75 percent state cost-sharing assistance, up to \$200,000. Eligible projects include land acquisition, wetland restoration and local ordinance development to prevent lake ecosystem or water quality degradation. Grants of up to \$50,000 are also awarded for lakes classification and related ordinance development.

Dam and Floodplain Management

Dam Safety Program

Chapter 31 of Wisconsin's State Statutes was developed to ensure that dams are safely built, operated and maintained. In 1986, Administrative Code NR 333 was adopted to provide design and construction standards for large dams. The Water Management Engineer administers these programs in the Lower Chippewa Basin. Responsibilities include dam inspections to assure dam safety, plan approval of proposed repairs and modifications, oversight of dam construction, operation and maintenance, as well as removal.

Want to know more about dams and floodplains?

<http://www.dnr.state.wi.us/org/water/wm/dsfm/>
<http://www.ferc.fed.us/>

Since 1986, Chapter 31.19 requires the Department to inspect large dams on navigable waterways once every 10 years. Large dams are defined as having a structural height of over 6 feet and impounding more than 50 acre-feet or having a structural height of over 25 feet and impounding more than 15 acre-feet. Dams that are federally owned or regulated are exempt from state inspections [see 31.19(2)(b)]. Staffing shortages has caused this aspect of the program to be 50% below its target.

Hydropower Re-Licensing and Compliance Monitoring Program

Most dams in the United States that are used for energy production or “hydropower” are regulated by the Federal Energy Regulatory Commission (FERC) under the Federal Power Act. FERC is the primary regulatory agency responsible for issuing new licenses, monitoring compliance with existing licenses and conducting dam safety inspections on hydropower projects in the United States. Historically, hydropower licenses were primarily focused on maximizing hydropower generation. Over time, resource agencies and the general public became concerned that operating conditions under existing licenses were having adverse impacts on aquatic habitat and organisms and recreational use opportunities.

In 1986, Congress passed the Electric Consumers Protection Act (ECPA), requiring that the FERC consider power and non-power values and interests equally. As a result, FERC developed a detailed five-year consultation process between hydropower owners, resource agencies and the general public when existing facilities came up for re-licensing. Since then, the Department has been participating in licensing activities on all new and re-licensed projects.

Within the past few years many stakeholders have formed settlement groups to address the new regulatory requirements placed on hydropower operators and owners, resource agencies and the general public. This new settlement process is mainly directed at negotiating resolutions to licensing issues so that all affected parties concur with the terms and conditions of the new operational license. This process was recently completed on the lower Chippewa River and is currently underway on the lower Red Cedar River.

Dam Grant Program

Since the advent of the Dam Safety Inspection Program in 1986, funding for dam repairs and modifications has been available to eligible communities through a Dam Grant Program. Communities facing repair or modification of their dam can apply for partial coverage of the costs. Eligible costs are limited to 50% of the total project including engineering costs, up to a maximum state contribution of \$200,000. Some communities use this fund for removing their dam.

Floodplain Zoning Program

The Wisconsin Water Resources Act of 1965 directed the WDNR to develop statewide minimum standards for shoreland and floodplain areas. The goals of the floodplain management program are to prevent flooding and flood-blighted areas, to minimize the costs of flood control projects, reduce tax dollars spent on flood relief, and to protect life, health and property. Counties, cities and villages are required to administer floodplain zoning regulations, to insure that new development is protected from flooding. The Lower Chippewa River Basin has 45 counties, cities and villages that have identified floodplain areas.

Flood Hazard Mitigation Program

Many older structures that predate floodplain zoning regulations remain susceptible to floods. Flood Hazard Mitigation (FHM) is a voluntary program that assists communities in developing plans to reduce or eliminate future flood losses by removing floodplain structures, flood proofing and elevating others. Communities must have a FHM Plan to be eligible for future flood disaster aid. Following the 1993 Midwest Flood, \$10 million dollars became available to Wisconsin communities. A notable project included acquisition of 50 Mississippi River floodway properties in Pierce County. The City of Eau Claire and Eau Claire County used FHM funds to acquire many floodway and floodplain properties, some of which had received considerable damages during the 1993 floods.

Drinking Water and Groundwater

The Drinking Water and Groundwater Program enforces several state statutes and state administrative codes, many of which are mandated by the federal Safe Drinking Water Act (SDWA). The WDNR, DATCP, DOT and COM (Department of Commerce) share enforcement responsibilities for state groundwater standards.

Want to know more about drinking water and groundwater?

<http://www.dnr.state.wi.us/org/water/dwg/>

Private Water Supply

The WDNR regulates the construction of private water wells and pump installations, ranging from low capacity wells serving private homes and small businesses to high capacity wells for crop irrigation or serving large industries. Well drillers and pump installers are licensed, and WDNR field staffs perform inspections to insure that they comply with DNR codes. In most cases, qualified professionals do private well water testing. Well water complaints may be investigated by DNR if there is evidence to suggest health-threatening contamination. If contaminants exceed state groundwater standards, a health advisory letter to the well owner will recommend actions to obtain a safe source of drinking water. Contaminants may include pesticides, solvents, petroleum products and health threatening heavy metals such as arsenic.

Wisconsin's *Well Compensation Grant Program* provides financial assistance to replace or treat private wells that deliver water that contains chemical concentrations exceeding state or federal drinking water standards. There are certain homeowner eligibility requirements. Within the basin about three to five individuals are assisted annually through this program (Tim Hanson, pers. comm.). In response to known areas of groundwater contamination, the DNR establishes "special well construction or advisory areas" to alert and advise land owners and well drillers that they need to take special precautions when drilling a well.

Public Water Supply

The DNR regulates the construction and operation of wells and water systems for municipalities, sanitary districts and smaller communities such as mobile home parks and residential subdivisions. Schools, restaurants, daycare centers, factories, motels, churches, parks and wayside wells are also regulated by the DNR. These systems are inspected and sampled regularly for compliance with safe drinking water standards, for contaminants such as fecal coliform bacteria, nitrates, lead, copper, volatile organic chemicals, pesticides, industrial chemicals and radium. When a water supply system fails to meet compliance standards, the public is informed, and the problem is corrected. The State Drinking Water Revolving Loan Fund assists communities with construction of improvements to eliminate drinking water contamination. The City of Chippewa Falls was recently awarded a loan from this fund to help pay for a nitrate removal treatment system.

Waterways and Wetlands

The Waterways and Wetlands Permit and Regulatory Program helps protect your water rights as well as public safety by ensuring adequate planning and design of projects affecting navigable public waters, shorelands and wetlands. Permit and plan approvals may be required for individual water projects. Site visits with landowners, in conjunction with local and federal administrators if appropriate, are arranged to learn site suitability for the proposed project, identify environmental impacts, and help the landowner modify the proposal if needed. Striking a balance between landowner needs and desires, and protecting public resources is one of the greatest challenges to water regulation staff.

Want to know more about waterways and wetlands?

<http://www.dnr.state.wi.us/org/water/fhp/>

<http://www.dnr.state.wi.us/org/water/fhp/waterway/index.htm>

<http://www.dnr.state.wi.us/org/water/wm/dsfm/>

<http://intranet.dnr.state.wi.us/int/water/fhp/wms/>

Department staff assists with a number of wetlands and shoreland management and protection programs, in cooperation with an array of state, federal and local agencies. In past decades, wetlands were often viewed as wastelands, useful only when drained or filled. In more recent times, wetland benefits to people and the natural world have become widely recognized. They can store and slow runoff waters and gradually release them, thereby reducing flood peaks. In some hydrologic settings groundwater discharging through wetlands can be important for stabilizing stream flows, especially during dry months. Wetlands can store or filter nutrients, such as phosphorus and nitrogen, providing water quality benefits. Wetland vegetation along a shoreline can hold soil particles and prevent shoreline erosion by reducing wave energy. Wetlands provide food and habitat for a wide variety of organisms, including fish, amphibians, reptiles, birds and insects. Many wildlife species depend upon wetlands habitat for part or all of their life cycle, for breeding, resting, escape cover, nesting and travel corridors. In recognition of these benefits, staffs provide technical assistance to landowners and cooperating agencies for wetland restoration projects.

As part of the state's effort to protect wetlands, the legislature established the Wisconsin Wetland Inventory in 1978. The WDNR was directed to inventory (map) Wisconsin's wetlands to obtain an accurate assessment of wetlands in the state. The initial inventory was completed in 1984.

Regulatory Programs

Department of Natural Resources staff assist with or manage a number of regulatory programs on the local, state and federal levels. Under Chapters 30 and 31 of Wisconsin Statutes, the Department reviews and processes permits for activities that involve physical alterations to surface waters. Examples include construction of dams and bridges, dredging of lake and riverbeds, reconstruction of boathouses, piers and fish cribs, stream realignments, rip-rap along shorelines and activities that change water level or flow.

The U.S. Army Corps of Engineers (COE) reviews and processes permit applications for projects located in navigable waters and wetlands under the Federal Clean Water Act. The state also approves projects in non-navigable wetlands, using a procedure called water quality certification. Water quality certification assures that water quality standards that have been established for public waters will not be violated.

State law requires counties, cities and villages to adopt and administer local regulations to control development along shorelands and in floodplains. The Department provides guidance for these programs. Activities such as flooding, draining, ditching, tiling, excavating, building and road construction are regulated in wetlands. Regulations in shoreland areas govern lot size, setbacks of buildings and structures from navigable waters, tree and shrub cutting, location and size of wastewater disposal systems, filling, and the construction of structures in floodplains. Often these regulatory programs are key tools for protection of our surface water resources.

Management Programs

The Department assists with wetlands and shoreland management and protection programs, in cooperation with an array of state, federal and local agencies. Farmlands adjacent to streams, lakes, ponds, sinkholes or wetlands that meet certain crop history requirements may be eligible under the Conservation Reserve Program (CRP) for cost sharing and rental payments to establish riparian buffers and filter strips.

The Wetlands Reserve Program (WRP) protects, restores and enhances wetlands and associated uplands through restoration cost-share agreements and easement acquisition. Eligible lands must be restorable and suitable for wildlife benefits, and may include wetlands cleared or drained for farming, lands adjacent to wetlands that contribute to wetland functions and values, drained wooded wetlands and habitat corridors that connect protected wetlands. The CRP and WRP programs are administered through the Consolidated Farm Services Agency (CFSA), with technical assistance from the county offices of the Natural Resources Conservation Service (NRCS) and the WDNR.

Other programs provide a variety of cost-share opportunities to restore habitat that can benefit wetlands, shorelands and other land and water resources. Examples include the Stewardship Incentive Program (SIP), Forest Incentives Program (FIP), Wildlife Habitat Incentive Program (WHIP), and the Wisconsin Forest Landowner Grant Program (WFLGP). Many state and federal conservation agencies as well as public and private-sector partners cooperate in the administration of these programs.

Runoff Management

The Department's Runoff Management Program protects Wisconsin's surface and groundwater resources from pollutants that are carried in runoff. Nonpoint source pollution occurs when rainfall, snowmelt, or irrigation water runs over land or through the ground, picks up pollutants, and deposits them into rivers, lakes, or ground water. Runoff pollution also causes adverse changes to the vegetation, shape, and flow of streams and other aquatic systems. Agriculture, forestry, grazing, septic systems, recreational boating, urban runoff, construction, physical changes to stream channels, and habitat degradation are potential sources of pollution.

Want to know more about runoff management?

<http://www.dnr.state.wi.us/org/water/wm/index.htm>

<http://www.epa.gov/owow/nps/index.html>

<http://www.cwp.org/>

Nonpoint Source Water Pollution Abatement Program

Wisconsin's Nonpoint Source Water Pollution Abatement Program provides grants to local governmental units, in watersheds selected for priority watershed projects. Grants can reimburse a portion of the cost of installing best management practices, which reduce the likelihood of pollutants being carried to streams, lakes or groundwater via runoff. Examples of agricultural best management practices (BMPs) include reduced tillage methods, nutrient and pesticide management, vegetated filter strips, streambank repair, and fencing to restrict cattle access. For existing urban areas best management practices may include development of construction site erosion control and stormwater management ordinances, and stormwater detention and infiltration facilities. Critical sites are those sites that are significant sources of NPS pollution. Under NR 120, BMPs are required at critical sites.

In 1978 the first priority watershed project was selected in Wisconsin and over the years the program evolved as a nationally recognized watershed based approach. Funding considerations and changes to Wisconsin's law have now changed the program to focus on smaller drainage areas. Grants are targeted towards degraded waters with funding assistance available for constructing and installing BMPs. Proposed new changes to Wisconsin law and administrative rules are now aimed at developing agricultural and urban standards of performance designed to help achieve water quality standards in these areas. The new standards will be applied statewide, but only when cost sharing dollars are available to assist landowners with the cost of compliance. Final rule revisions are expected by 2002.

The Priority Watershed (PWS) Program is a joint effort of the WDNR, Department of Agriculture, Trade and Consumer Protection (DATCP), the University of Wisconsin Extension (UWEX), counties (usually through their Land Conservation Departments), municipalities, and Lake Districts.

Want to know more about the Priority Watershed Program?

<http://www.dnr.state.wi.us/org/water/wm/nps/npsprogram.html>

In addition to the PWS Program, grants are available through the state for Targeted Runoff Management (TRM) Projects. Local units of government can apply for funds to undertake construction or implementation of best management practices to control nonpoint source pollution. These projects are generally short-term, and must be completed within one year.

Wastewater and Stormwater

Municipal and Industrial Facilities

The WDNR regulates municipal and industrial facilities discharging wastewater to surface water or groundwater through the Wisconsin Pollutant Discharge Elimination System (WPDES) Permit Program. Specific permits are written for many facilities, which regulate activities such as effluent discharges to surface and groundwater, biosolids disposal practices, facility upgrades, pretreatment facilities, toxic discharges, and antidegradation and compliance maintenance plans. General permits are also issued for smaller activities like pit or trench dewatering, vehicle washing, noncontact cooling water, swimming pool drainage, asphalt and concrete operations.

Want to know more about wastewater and stormwater?

<http://www.dnr.state.wi.us/org/water/wm/ww/index.htm>

<http://www.dnr.state.wi.us/org/water/wm/glwsp/ssaplan/controls.htm>

The state also requires all manufacturing industries, as well as transportation facilities that conduct vehicle maintenance, landfills, steam electric generating plants, auto salvage yards, and other specific operations to obtain a WPDES Stormwater Permit. These facilities must prepare and implement stormwater pollution prevention plans, which include good housekeeping practices to reduce the exposure of industrial materials to stormwater. This requirement is part of the existing federal stormwater permit program.

Waste Disposal

Municipal biosolids are the residual of the wastewater treatment process.

Biosolids generally contain substantial levels of nitrogen, phosphorus, potassium and other nutrients. Biosolids treatment, quality, final disposition and general management is regulated by Ch. NR 204, Wis. Adm. Code, which was revised effective January 1, 1996 to incorporate federal standards published in 1993. Wisconsin has been a national leader since the middle 1970s in recycling biosolids as fertilizer through application on agricultural land.

Want to know more about waste disposal?

<http://www.dnr.state.wi.us/org/gmu/groundwaterfiles/wastedis.html>

Every application site must be approved prior to use. Approval is based upon many criteria, including site characteristics, slopes, setback from surface waters, residences, wells and public areas, depth to high groundwater or bedrock and soil permeability. In addition, biosolids application cannot exceed the nutrient needs of the crop to be grown. To minimize the amount of phosphorus in biosolids that reaches surface waters, special attention is given to ensure that biosolids remains on land. Land application of biosolids is prohibited on frozen or snow-covered land.

Unlike biosolids, septage is either the solids or wastewater generated by private on-site wastewater systems and treatment. Septage can be processed through sewage treatment plants or is directly land applied on approved sites. Site approval is based on the same criteria as that for municipal sludge.

In unsewered areas, homeowners rely on septic tanks, mound systems or holding tanks to dispose of domestic wastewater. Holding tanks are very expensive to operate due to pumping frequency and high pumping costs. Proper installation and routine pumping is critical for minimizing impacts on groundwater.

WPDES permits may be site-specific or general. Specific permits are issued to individual facilities. General permits are issued statewide to cover facilities with similar discharges. The DNR makes a determination on whether a particular facility is appropriately covered by a general or specific permit. Examples of operations that would require general permits include those that discharge non-contact cooling waters, swimming pool and spa water, potable water treatment and conditioning, discharge of treated groundwater, landspreading of liquid industrial waste, biosolids and food processing by-products.

Municipal Stormwater Program

Wisconsin's Stormwater Program seeks to reduce the water quality problems that come from rainfall and snowmelt runoff in many developed areas. Roof tops and pavements collect and channel stormwater, carrying it to rivers, streams and lakes. Urban stormwater can be laden with sediment, chloride, pesticides, nutrients, bacteria, heavy metals and other toxic materials. Studies conducted in Madison, Milwaukee and Eau Claire documented levels of metals, suspended solids and nutrients in stormwater effluent that exceed some in-stream water quality standards. Stormwater flows quickly over hard surfaces, and can cause flooding, "flashy" high flows and the loss of "base" flow during dry periods.

The U.S Environmental Protection Agency (EPA) now requires cities with populations of more than 100,000 to adopt and implement a storm water management plan. Wisconsin has extended this requirement to cities with populations larger than 50,000 that are also located within a Nonpoint Source Priority Watershed project. The city of Eau Claire (also Altoona, Chippewa Falls and the Town of Washington) (Per D. Simonson) falls into this category due to the Lowes Creek Priority Watershed project.

Large Construction Sites Stormwater and Erosion Control Program

Construction sites that disturb more than five acres of soil are also required to obtain a construction site erosion control permit that includes implementation of a storm water management plan, to minimize the amount of runoff and sediment that leaves the site. Examples of construction sites that require a stormwater permit from the WDNR include subdivisions, parking lots and athletic fields that exceed five acres in size. The Department of Commerce handles stormwater permits for sites where public, industrial and commercial buildings are a part of the project. (per E. Rortvedt) Occasionally, these projects also require DNR permits for disturbing land near a waterbody (regulated under Chapter 30). In those cases, Department of Commerce sometimes refers all regulatory authority to the DNR to decrease response time and reduce overlap.

Manure Management Program

Wisconsin's Manure Management program requires very large animal operations or other operations with manure runoff, to control their polluted runoff. Handling, storage and disposal of animal manure is a widespread and common activity in Western Wisconsin. By requiring operations exceeding one thousand animal units (equivalent to 700 cows) to obtain a WPDES animal waste permit, the department can reduce the water quality impacts from runoff of manure, which contains pollutants like bacteria, oxygen demanding organic material, and nutrients. As the agricultural trend of farm abandonment and consolidation into larger farms continues, more permits will be developed to address the need for runoff management. Traditional conservation practices will be combined with nutrient management to control manure runoff from livestock yards as well as from croplands that receive landspread manure.

For both large and small livestock operations, new agricultural performance standards will prohibit direct runoff from a feedlot or stored manure from entering waters of the State. Of the 45,000 livestock operations in Wisconsin most will not require permits for the handling, storage or spreading of manure. The new agricultural performance standards along with voluntary management practices will form the basis for Wisconsin's Manure Management program for the majority of livestock farms. Newly permitted operations are required to develop and implement nutrient management plans that will meet State standards and include a manure management plan.

Sewer Service Area Plans

Sewer service area planning is required by the Federal Clean Water Act for communities within designated planning areas, or with populations larger than 10,000. Through this process, communities develop 20-year plans to guide placement of city sewer lines. The plan delineates lands that are most

suitable for development and that can be serviced by a public wastewater collection and treatment system. To protect water resources, the plan designates "environmentally sensitive areas" where new sewered development is prohibited. If these protected areas were to be developed, bacteria, sediment, and other pollutants could find an easy route to lakes, streams, and groundwater. Regional staffs assist communities in developing sewer service area plans and identifying the environmentally sensitive areas, such as wetlands, shorelands, floodways, steep slopes, and highly erodible soils. These plans should be reviewed, and updated if necessary, every five years.

Land Management Programs

Forestry

The DNR Forestry program manages and protects the forest resources.

Forestland and urban trees

significantly contribute to our quality

of life, and are used by many citizens in the Basin. The Department's Strategic Plan for Forestry identifies important forestry issues, and guides programmatic efforts towards addressing these issues through integrated planning and management. The Division of Forestry recently completed an assessment of the Wisconsin forests (Wisconsin Forests at the Millennium-An Assessment November 2000) and will begin work on development of a Statewide Forest Plan.

Want to know more about forestry programs?

<http://www.dnr.state.wi.us/org/land/forestry/>

<http://www.wisconsincountyforests.com/index.html>

<http://www.dnr.state.wi.us/org/land/forestry/usesof/bmp/bmptoc.htm>

Forest Ecology and Silviculture programs focus on developing a better understanding of forestlands through inventory, assessment and classification efforts. This information assists in development of land management plans. The Bureau of Endangered Resources staff contributes by identifying and guiding management of unique and rare forest resources. All Department foresters assist in implementing Forestry Best Management Practices, to help reduce erosion and water pollution from forest harvest activities. Educating the public about forestry resources is another important component of the work effort of this program.

The County Forest program is a long-standing county/state partnership that includes the Chippewa County and Eau Claire County Forests. The Department provides technical assistance to county forests, and interest-free loans and grants to county forest programs. Regional staff approves annual work plans for each county, review ten-year forest plans, and approve timber sales.

Regional DNR foresters assist private, non-industrial landowners to better care for their forestlands. They encourage landowners to manage for the sustainable production, enhancement and protection of forest resources. The objectives of individual landowners and the short and long-term regional forestry management goals are considered in developing stewardship plans.

Department foresters work with private cooperating foresters, agencies and groups to implement forestry practices. They provide education programs for landowners, resource managers, local governments and the general public. They also administer the forest tax laws and the federal cost-sharing programs that help landowners invest in long-term forestry practices. Landowners may apply for Managed Forest Law designation of their private woodlands. The program allows them to receive tax benefits and they must adhere to a forest stewardship plan that is developed for their woodland.

The Urban and Community Forestry Assistance Program enables and encourages sound management of Wisconsin's urban forest ecosystems. The Urban Forester works with communities of all sizes, "green" industry professionals, businesses, schools, non-profit organizations and the public to provide technical assistance, education and training and resource development.

A Regional Forest Pest Specialist assists in minimizing insect and disease damage to forestland. Annual insect and disease surveys are conducted on state, private and county forestland and pest management recommendations are developed for DNR Property Managers. The Regional Forest Pest Specialist also provides a wide variety of programs and information on forest pests and discusses pest management principles and options with DNR staff, industrial and consulting foresters and private woodland owners.

Forest Fire Management

The Fire Management Program operates on lands outside of cities and incorporated villages. Two Ranger Station facilities are located at Cornell and Fairchild. In 2001 the Fairchild station will be replaced in Augusta to be strategically located to meet the forest fire risks associated with urban development. Fire staff work very closely with emergency fire wardens, other regional employees, federal and state agencies, fire departments, town and county officials and citizens.

Responsibilities of the Fire Management Program include fire prevention, detection, pre-suppression and suppression. Educational programs for children and adult groups promote fire prevention. Signs and permits are also used to gain cooperation in prevention efforts.

Six lookout towers, aircraft and public reporting are all used to detect forest fires as quickly as possible. A highly effective fire management staff and infrastructure work with all cooperators and partners to maximize fire management program effectiveness. When fires occur, an Incident Command System (ICS) is utilized to organize all fire suppression forces on each fire, to keep fires as small as possible in a cost-effective manner. The forest law enforcement program contributes to the Region's successful forest fire management.

Wildlife

The Bureau of Wildlife Management oversees a complex web of programs that incorporate state, federal and local initiatives primarily directed toward wildlife habitat management and enhancement. Programs include land acquisition, development and maintenance of State Wildlife Areas, and other wild land programs such as State Natural Areas. The Lower Chippewa River Basin has a very active Private Lands component that is integrally connected to county services and federal agencies.

Want to know more about wildlife programs?
<http://www.dnr.state.wi.us/org/land/wildlife/>
<http://www.dnr.state.wi.us/org/land/wildlife/links.html>

Department wildlife biologists work with local government staff to integrate wildlife management with county-based agricultural services provided by the Farm Service Agency (FSA) and the Natural Resources Conservation Service (NRCS). The Regional Private Lands Biologist provides landowners with technical advice and information and education on wildlife and habitat management. Some state and federal cost share programs provide incentives to improve habitat on privately owned lands. For instance, wildlife biologists solicit funding for wetland restoration on private, state and federal lands.

Wildlife Management staffs conduct wildlife population and habitat surveys, prepare property needs analyses, develop area wildlife management plans and collaborate with other DNR planning efforts such as Park or Fishery Area Master Plans to assure sound habitat management. A landscape scale Habitat Restoration Area was recently established to restore a viable grassland community in a portion of the Basin that was historically prairie. Eventually it is hoped to establish 20,000 acres of permanent grassland with this project. A Citizens Advisory Committee is involved to help establish acquisition guidelines.

Wildlife biologists prepare annual game harvest recommendations for deer, bear, turkey and Canada geese. They evaluate and update hunting, trapping and property management regulations, administer

permits for state licensed game farms, shooting preserves, fur farms, dog training, and wildlife rehabilitation facilities. Wildlife Management oversees many educational programs to encourage responsible land management techniques and practices.

Endangered Resources

Endangered Resources staff (Central Office)

provide the Lower Chippewa Basin with

expertise and advice on endangered resources. They manage the Natural Heritage Inventory Program (NHI), which is used to determine the existence and location of native plant and animal communities and of Endangered or Threatened Species of Special Concern. The NHI helps identify and prioritize areas suitable for State Natural Area (SNA) designation, provides information needed for feasibility studies and master plans, and maintains the list of endangered and threatened species. A landscape scale Natural Area was recently approved to protect some key areas of the Lower Chippewa for the endangered resources present (see Lower Chippewa State Natural Area in Chapter 1).

Want to know more about endangered resources?

<http://www.dnr.state.wi.us/org/land/er/>

Species Recovery and Management Planning and Implementation are specifically required under the State Endangered Species Law. Examples include the Timber Wolf Management Plan, Timber Rattlesnake Management Plan and the Karner Blue Butterfly Habitat Conservation Plan. Endangered Resources staffs also collaborate with basin staff in planning and assessing projects and activities to determine effects on rare species or communities, and to assist in finding opportunities for integrated ecosystem management.

A permit for the incidental take of an Endangered or Threatened species is required under the State Endangered Species Law. The Endangered Resources Program oversees the permit process, reviews applications and makes permit decisions.

State Parks and Trails

The State Parks and Trails Program protects unique and significant natural resources and recreation opportunities. Management strives to preserve these diverse ecosystems while, at the same time, providing compatible recreation opportunities. The Basin's State Parks, Trails, Recreation Areas and other lands offer scenic beauty, educational and recreational opportunities for those seeking a peaceful outdoor experience.

Want to know more about state lands?

<http://www.dnr.state.wi.us/org/land/parks/>

<http://www.dnr.state.wi.us/org/land/er/snas.htm>

<http://www.dnr.state.wi.us/org/at/et/geo/iceage/index.htm#>

State Parks provide areas for public recreation and education in conservation and nature study. Hiking, camping, picnicking, swimming, fishing, boating, cross country skiing and bird watching are common activities. An area may qualify to become a state park by reason of its scenery, its plants and wildlife, or its historical, archaeological or geological qualities.

State Trails provide areas for public recreation and transportation. State Trails can be classified as either State Parks or State Recreation Areas. Most State Trails are bicycle and hiking trails. Types of use are managed to avoid conflicts and provide a quality recreation experience. An area may qualify to become a state trail by reason of its scenery, its plants and wildlife, transportation capability or its historical, archaeological or geological qualities.

State Recreation Area lands and waters are environmentally adaptable to multiple recreational uses or preservation. Like State Parks, these areas provide outdoor-based public recreation, conservation education and nature study. Types of use are managed to avoid conflicts and provide a quality recreation experience.

State Natural Areas generally have escaped environmental disturbance so that recovery of natural conditions can occur. Natural Areas have educational or scientific value, or are important as a reservoir of the state's genetic or biologic diversity. They provide a reserve for native biotic communities and frequently provide habitat for endangered threatened or critical species. Natural Areas also may include significant geological or archaeological features. Basin park system personnel cooperate with the Bureau of Endangered Resources in delivering awareness, education and management guidance for these unique and rare resources.

The Ice Age National Scientific Reserve is administered by the state in cooperation with the National Park Service. These areas preserve significant geological features left by the last glacier that shaped Wisconsin's landscape. They have educational and scientific value and provide outdoor based recreation. The Ice Age National Scenic Trail and Chippewa Moraine Ice Age Unit are examples of this program within the Lower Chippewa Basin.

Want to know more about the Ice Age Trail?
<http://www.iceagetrail.org/>

Partnerships

Many county and municipal departments, conservation, civic, and youth organizations and private volunteers participate in the operations, development and management of the State Parks and Trails program. The Department cooperates with the *Ice Age Park and Trail Foundation* in administering the Ice Age National Scenic Trail program. Friends Groups are private, not-for-profit organizations that support recreation, education and interpretation programs. In the Basin there are active Friends Groups at Lake Wissota State Park and Chippewa River, Red Cedar and Old Abe State Trails. In addition there is a statewide *Friends of Wisconsin State Parks*.

Facilities and Lands

The Facilities and Lands program supports the basin with a Land Services Team within the

Region. They provide support for land acquisition, facility design and planning services. Engineering staffs work with property managers to complete the goals of the development program. They design and write contracts for DNR projects including boat landings, bicycle trails and other construction jobs. Land Services also assists with feasibility studies to establish new lands projects, master planning, site planning and design.

Want to know more about facilities and lands?
<http://www.dnr.state.wi.us/org/land/facilities/>

Land Acquisition

The Department is given the authority to acquire land for various conservation projects through legislation and state statutes. Within approved project areas, property managers contact landowners that are willing to sell their property. Department real estate agents work with DNR managers to negotiate the legal description and land rights to be purchased with the landowner. They arrange for appraisals and complete the land sale transaction process once an offer is accepted by a landowner.

Chapter 3 - Land and Water Resources Inventory

This chapter describes the results of many inventories and assessments of the surface water, groundwater and land resources of the basin.

Water Resources

Water resources of the Lower Chippewa River Basin include over 2,602 miles of named rivers and streams, 378 named lakes, 69 flowages and 314,375 acres of wetlands. In addition, an abundant groundwater resource provides more than 30 million gallons per day to about 120,000 citizens and other users in the basin. This section of Chapter 3 summarizes the available information about these water resources. It also contains inventory and assessment information related to human use of water resources, including drinking water, wastewater and point source discharges, non-point source or runoff pollution, dams, floodplains and water regulations.

Water Resource Classification

Lakes, rivers and streams in Wisconsin have been classified or designated in several ways for the purposes of setting water quality standards. These standards help protect water supplies, fish and wildlife, water based recreation and other legitimate uses of water resources. Water quality standards are used to develop and implement strategies to meet water quality goals, set effluent discharge limits and as a basis for making other regulatory, permitting or funding decisions. Examples of water resource classifications or designations include "Outstanding and Exceptional Resource Waters" (discussed below) and "Stream Biological Uses" (discussed in the tributary streams section). To meet federal requirements, the WDNR has developed an "Impaired Waters" list of waters that are not meeting water quality standards or designated uses (discussed below).

More detailed information about water resource classifications can be found in Appendix 6 - Watershed Tables for the Lower Chippewa River Basin.

Outstanding and Exceptional Resource Waters

Some rivers, streams and lakes in the state are designated as outstanding or exceptional resource waters due to valuable fisheries, unique hydrologic or geologic features, outstanding recreational opportunities, or pristine environmental settings that are mostly unaffected by human activities. NR 102, Wis. Adm. Code contains the official statewide listing of these designated waters.

Outstanding Resource Waters (ORW) have the highest value as a resource, excellent water quality and high quality fisheries. They do not receive wastewater discharges and point source discharges will not be allowed in the future unless the quality of such a discharge meets or exceeds the quality in the receiving water. This classification includes national and state wild and scenic rivers and the highest quality Class I trout streams in the state. There are 15 stream sections and lakes with ORW designation (See Appendix 3 - Outstanding and Exceptional Resource Waters of the Lower Chippewa River Basin).

Exceptional Resource Waters (ERW) have excellent water quality and valued fisheries but already receive wastewater discharges or may receive future discharges, if necessary to correct environmental or public health problems. This classification includes Class I trout streams as identified in the 1980 Blue Trout Book. There are 47 ERW-designated stream or stream segments in the basin (See Appendix 3 - Outstanding and Exceptional Resource Waters of the Lower Chippewa River Basin).

Impaired Waters and Total Maximum Daily Loads (TMDLs)

In April 1998, as required by Section 303(d) of the Federal Clean Water Act, the WDNR identified and submitted to the U.S. Environmental Protection Agency a list of impaired Wisconsin waterbodies. This 303(d) list identifies waters that are currently not meeting water quality criteria for specific substances or designated uses. The list of impaired waters is built around several *categories* of factors that are causing the impairment, including nutrients, sediments, and other pollutants from point sources, nonpoint sources, airborne pollutants, contaminated sediments and physical or habitat degradation. In the Lower Chippewa River Basin, there are currently 37 303(d) listed waters (See Appendix 4 - Lower Chippewa Basin 303(d) Waters).

The Bureau of Watershed Management is responsible for Wisconsin's 303(d) Impaired Waters Program, as well as for the development of a Total Maximum Daily Load (TMDL) strategy to improve the condition of listed waters. The TMDL process includes identifying and analyzing pollutant problems and developing an implementation plan to improve water quality. The implementation strategy will include existing DNR programs, as well as new activities to complement the existing DNR Water Program. The menu of TMDL activities and management responses will likely be expanded to include a wide range of strategies. Institutional controls (e.g., fish consumption advisories), ordinances, best management practices, watershed plans, pollutant trading, restrictive covenants, other types of land management agreements and additional WPDES restrictions, for traditional point sources, storm water and CAFOs are just some of the possible management options.

Currently, TMDLs are being developed for three impaired waterbodies in the Lower Chippewa River Basin: Half Moon Lake in the City of Eau Claire, and Little Lake Wissota and Moon Bay of Lake Wissota.

Rivers and Streams and Associated Fisheries

The Lower Chippewa River Basin has an abundant, diversified and unique river and stream resource. Streams in the basin range from high-gradient “coulee” type streams in the western-most portion of the basin to low-gradient sand-dominated streams in the central and eastern parts of the basin. These small streams support some of the state's finest coldwater trout fisheries and excellent yet under-appreciated warmwater sport fisheries. In addition to the abundant and diversified small streams, there are several major rivers in the basin. “Big rivers”, including the Chippewa, Red Cedar, Hay and Eau Claire Rivers are complex and dynamic river resources. These rivers provide habitat for many of the state's endangered and threatened aquatic species as well as unique and fragile plant and animal communities. Department partnerships with citizens, through the new Rivers and Streams Planning and Protection Grant Program, Habitat Improvement programs, Red Cedar Partnership and others are key to protecting, maintaining and enhancing the quality of these very complex, unique river and stream resources.

Mainstem Rivers

Chippewa River

The Chippewa River is one of the largest rivers within Wisconsin. There are 103 miles of the Chippewa River in the basin, from the Holcombe dam downstream to the Mississippi River. This river section includes five flowages and approximately 69 miles of free-flowing river. Dams owned and operated by Northern States Power Company for hydropower generation create the flowages. These flowages, in downstream order, include: Cornell Flowage (836 acres), Old Abe Lake (996 acres), Lake Wissota (approximately 6,212 acres), Chippewa Falls Flowage (282 acres), and Dells Pond (1,183 acres). The free-flowing river segments are present below the Cornell dam (approximately 1 mile), the Chippewa Falls dam (approximately 7 miles), and the Dells dam (61 miles). The sixty-one miles of the Chippewa

River below the Dells Dam to its confluence with the Mississippi River represent some of the last remaining unimpounded large riverine habitat in the Upper Midwest. The average annual flow for the river is 4,343 cubic feet per second (cfs) at the Holcombe dam and 5,235 cfs at the Dells dam. Above the Dells dam, major tributaries to the river include the Fisher and Yellow Rivers. Downstream of the Dells dam, major tributaries include the Eau Claire and Red Cedar Rivers. Numerous smaller tributaries also contribute flow to the lower Chippewa River.

Lower Chippewa River Settlement Agreement: Twelve stakeholder groups formally signed this agreement in mid-January 2001. These included the WDNR and Northern States Power of Wisconsin (NSP, doing business as Xcel Energy), who worked for three years to resolve issues surrounding relicensing of three of NSP's hydroelectric projects on the lower riverway. The long-term agreement (30+ years) will provide continued production of hydropower along with environmental and recreational use benefits for the river.

Water Quality: The Chippewa River has slightly brown-stained, clear water with a shifting sand substrate. The river is greatly impacted by water quality of its numerous impoundments. Generally, algae blooms in the impoundments increase turbidity in the river during summer. The six hydropower dam impoundments greatly affect the hydrology and ecosystem of the Chippewa River within the Basin. Water quality of impoundments is discussed more fully in the following lakes and impoundments section.

The Lower Chippewa River impoundments effectively trap suspended sediment by reducing flow velocities, allowing the solids to settle. The Chippewa River below the last impoundment, Dells Dam in Eau Claire, takes on a very different character from the upstream-impounded areas. Active bank erosion between the Dells Dam and Mississippi River shapes the channel and aquatic habitat. The river meanders its way to Caryville, where the channel starts to become braided. At Durand, the river is less sinuous, but braids again near its mouth.

The erosion of coarse-grained glacial outwash contributes large quantities of sand to the Chippewa River. Deposition of this sand causes braiding of the sinuous reaches. It is estimated that the sediment load at the HWY 35 bridge near Lake Pepin is 940,000 tons of sediment per year (Simons, D. B. and Associates, 1998). The transport of sand and gravel occurs from Dells Dam to Caryville, though the particle size decreases to sand by Durand. This change in particle density occurs due to the braided channel between the two cities, which slows water velocity.

Trend Analysis: A study of monthly water sample results from the Chippewa River at Chippewa Falls from 1961-1976 and 1988-1999, and Holcombe from 1977-1987 and 1996-1999 provides information on trends in water quality of the river. In Chippewa Falls, pH, ammonia, chloride, and phosphorus levels have shown a significant change over time. The levels of pH appear to be showing greater fluctuation between extremes (5.5-9.0) in 1988-1999, than the lesser extremes (6.0-7.5) of 1961-1976 Beaster (2000). Greater pH fluctuations can generally be attributed to increasing levels of eutrophication.

Ammonia and total phosphorus levels appear to be in decline since the early 1960's, presumably due to stricter controls put in place by the Clean Water Act, revised in 1972, and the recent regulations placing a 1 mg/L phosphorus limit on effluent from most wastewater treatment plants. Chloride levels appear to be increasing over time, possibly due to the increased use of road salt and increasing wastewater treatment plant discharge volumes. Suspended solids, total kjeldahl nitrogen, nitrate-nitrogen, and dissolved phosphorus have not shown a significant change over time. At Holcombe, pH also shows a trend similar to samples taken at Chippewa Falls from the late 1970's to the late 1990's. Suspended solids appear to be increasing slightly as well. None of the other parameters mentioned above show a significant trend over time at the Holcombe site (Beaster 2000) (Appendix 5 - Water Quality Trends Analysis for the Lower Chippewa River).

Fishery: The Lower Chippewa River downstream from the Dells Dam harbors 70% of the states fish species and is one of the most diverse fisheries in the Upper Midwest (LCRSNA, 1999). Recent and historic fisheries assessments on this section of river have documented the presence of many rare and unique fish species. Three species, crystal darter, goldeye, and black redhorse are on the state endangered species list. Four species, paddlefish, blue sucker, river redhorse and greater redhorse are on the state's threatened species list and the, western sand darter, american eel, mud darter and lake sturgeon are on the states special concern list. Common gamefish in this section of river include smallmouth bass, walleye, sauger, northern pike, muskellunge, lake sturgeon, channel and flathead catfish (Benike, 2000). Other common non-game fish species include shorthead, silver and golden redhorse, smallmouth and bigmouth buffalo, carpsuckers, mooneye and gizzard shad (Benike, 2000). Currently, no commercial fishing is allowed in the Lower Chippewa River. Past commercial fishing in the river, primarily for buffalo, resulted in the incidental catch of paddlefish and sturgeon. No fish stocking occurs in the free-flowing sections of the river.

Survey work conducted on the Chippewa River upstream of the Dells dam have identified 52 species of fish including the greater redhorse, which is a state-listed threatened species. The major sport fish species in the river include walleye, muskellunge, northern pike, smallmouth bass, channel catfish, flathead catfish, lake sturgeon, bluegill and black crappie.

The Chippewa River has a six-week fall hook and line season for lake sturgeon. Because of its limited range in Wisconsin, the lake sturgeon is considered a species of special concern.

Red Cedar River

The Red Cedar River originates in southwestern Sawyer County and flows south into the Chippewa River in southern Dunn County. It drains portions of seven counties: Barron, Chippewa, Dunn, Polk, Rusk, Sawyer, St. Croix and Washburn. The Red Cedar River and its tributaries drain eight of the 24 watersheds in the Basin. The Red Cedar drainage area makes up a third of the Lower Chippewa River Basin, nearly 1,900 square miles. Land use ranges from mostly forested in the north to predominantly agricultural in the south. The Red Cedar River drainage area is located in the North Central Hardwood Forest Ecoregion (Omernik and Gallant, 1988). This EPA ecoregion is characterized by nearly level to rolling glacial till plains and significant agricultural land use. Within this area there are approximately 255 streams with a total length of 1,302 mi. Of these 141 are unnamed creeks and ditches. The average gradient for the Red Cedar River is 4.6 ft/mi. The average discharge at Menomonie (94% of drainage area) is 1,235 cubic feet/sec. The Red Cedar River bottom is composed primarily of sand, gravel, and rubble with limited areas of boulder, bedrock, muck and silt. Land use in this sub-basin ranges from mostly agriculture (64%) in the south to predominately forest (27%) in the north. Red Cedar Lake, Rice Lake, Tainter Lake and Lake Menomin are large man-made impoundments on the Red Cedar River. The river also receives water via tributaries from other impoundments including Beaver Dam Lake, Long Lake, Bear Lake and Lake Chetek.

Water Quality: Documented water quality problems related to phosphorus include impoundment eutrophication and dissolved oxygen problems in heavily vegetated stream reaches. Tainter Lake and the Red Cedar River above Tainter Lake suffer from high levels of mercury in sport fish and are subject to consumption advisories.

Water quality problems related to phosphorus have been documented in the Red Cedar River system; impoundment eutrophication (Schreiber 1992; Dunn Co. LWCD, 1992) and dissolved oxygen depletion take place in heavily vegetated stream reaches (Borman and Schreiber 1992). While these problems were evaluated in detail only in Tainter Lake and the Red Cedar River below Rice Lake, they likely exist in other, similar environments elsewhere in the sub-basin.

The U.S Environmental Protection Agency provided funding for further evaluation of the frequency, extent and duration of these problems as well as an evaluation of the significance of point and nonpoint sources of phosphorus in the seven upper watersheds (LC05-LC11). The goal of the project was to develop an implementation plan for phosphorus control in the basin, based on site-specific impacts to waterbodies. Project stakeholders include local governments, municipalities, industries and water user groups.

Fishery: The Red Cedar River fishery varies from upstream locations to downstream due to natural and or man made barriers. In total, the Red Cedar River Basin contains approximately 97 species of fish. Recent (Benike, 2000) and historic fisheries surveys (Fago, 1984) have documented a number of rare species downstream of Lake Menomin. The crystal darter and black buffalo are endangered species. The river and greater redhorse and blue sucker are threatened species. Species of special concern include the mud darter, american eel and lake sturgeon.

Upstream of Lake Tainter, the following rare species can be found (Fago, 1984 and Engel, 2000): Ozark minnow, pugnose, weed and redbfin shiners, greater redhorse, least darter and an occasional lake sturgeon. Many species of game and panfish can be found in the Red Cedar River; however, the primary sport fishery is composed of walleye and smallmouth bass and to a lesser extent northern pike and panfish, such as crappies, white bass and rockbass. Walleye and smallmouth bass populations are the primary gamefish on the riverine portions of the Red Cedar River. From studies that have been collected (Engel, 2000 and Benike, 2000) the walleye and smallmouth bass fishery is more abundant in the riverine section upstream of Tainter Lake than the riverine section downstream from Lake Menomin. Other unique fish species such as channel catfish, sauger and shovelnose sturgeon can be found in the river downstream from Lake Menomin. Redhorse and suckers are the most abundant species found throughout the river system.

Eau Claire River

The North Fork of the Eau Claire River originates in southwestern Taylor County. It flows for approximately 48 miles before joining up with the South Fork in Eau Claire County. The South Fork of the Eau Claire River originates in northwestern Clark County and is approximately 40 miles in length. The main stem of the Eau Claire River flows in a westerly direction for approximately 34 miles before emptying into the Chippewa River in the City of Eau Claire. The Eau Claire County Forest lies along the majority of the river's main stem. The Clark County Forest lies along approximately the lower five miles of the South and North Forks. Two major impoundments are present on the main stem of the river – Lake Eau Claire (1,118 acres) and Lake Altoona (840 acres). The flowages are used exclusively for recreation although historically there were efforts to convert both dams to hydropower generation.

Mead Lake is a 320-acre impoundment of the South Fork in Clark County, used exclusively for recreation. Numerous small streams drain into the North Fork, South Fork and main stem of the river. The average annual flow of the river is 557 cfs at the Lake Eau Claire dam and 568 cfs at the Lake Altoona dam. The drainage area upstream of the Lake Altoona dam is approximately 811 square miles.

Water Quality: The Eau Claire River has slightly brown-stained, generally clear water with a shifting sand substrate. Planktonic algae from Lake Altoona cause some turbidity during summer. Also, the Otter Creek watershed in Eau Claire contributes considerable suspended sediment loading during storm events.

Fishery: Limited fishery surveys have been conducted in the Eau Claire River and very little is known about the fish community in the river below the Altoona dam. It is assumed that many of the fish species present in the Chippewa River below the Dells dam also may use this portion of the Eau Claire River. Fifty-two fish species have been collected from the river upstream of the Lake Altoona dam. None of

these species are on the state endangered or threatened species list. Ten additional species are known to exist below the Altoona dam. Of these, the paddlefish and blue suckers are state-threatened species.

The major sport fish species in the river include walleye, muskellunge, smallmouth bass, yellow perch and black crappie. Currently, no commercial fishing is allowed in the Eau Claire River. Except for the flowages, no fish stocking occurs in the river.

Summary of Mainstem River Resource Issues, Threats and Opportunities

Protection and Management of Threatened and Endangered Species: The Chippewa, Red Cedar and Eau Claire rivers are complex and very dynamic, and are some of the last free-flowing segments of “big rivers” in the Upper Mississippi River Valley. Many of the state's endangered and threatened resources and some of the states “big rivers species” are found in the free-flowing segments of these Rivers. The status, life history and range of these species needs to be more well defined in order to provide effective preservation and habitat management.

Inventory and Monitoring Needs: Lack of information on the biological community of the “big rivers” in the basin contributes to sub-optimal management of these complex resources. Inventory and monitoring needs include sedimentation, non-point source influences, contaminated fish monitoring, fish migration and passage, water level fluctuations from hydropower operations, water quality impacts from reservoirs and agricultural uses, waste assimilation, increased recreational use demands and land use changes in the watershed. Effective future management will require that multiple stakeholders participate in identifying common goals for the big river resources.

Hydropower relicensing opportunities: Hydropower peaking operations, lack of fish passage, or poor water quality can negatively affect the aquatic ecosystem of many rivers. Periodic relicensing requirements provide an opportunity to adjust hydropower operations for the benefit of river ecosystems. Relicensing generally occurs about once every 30 years, and should be considered a high priority opportunity.

Tributary Streams

Stream Biological Uses

Wisconsin streams are classified according to the biological uses that are desired for each stream. Stream classification is a factor in determining the impacts of pollutants and in setting pollutant load limits. Surface water quality standards and criteria, contained in Chapters NR 102, NR 104, and NR 105 Wisconsin Administrative Code, are expressions of the conditions considered necessary to support biological and recreational uses. Streams are classified as one of the following:

COLD = Coldwater Communities include surface waters capable of supporting a community of coldwater fish and other aquatic life or serving as a spawning area for coldwater fish species.

WWSF = Warmwater Sport Fish Communities include surface waters capable of supporting a community of warmwater sport fish and/or serving as a spawning area for warmwater sport fish.

WWFF = Warmwater Forage Fish Communities include surface waters capable of supporting an abundant diverse community of forage fish and other aquatic life.

Trout streams carry a separate designation found in "Wisconsin Trout Streams" (DNR Publication number 6-3600(80)) and Outstanding/Exceptional Resource Waters, Wisconsin Administrative Code NR 102.20 and NR 102.11. Trout stream classes are:

Class I trout streams are high quality, and populations are sustained by natural reproduction.

Class II trout streams have some natural reproduction but may need stocking to maintain a desirable fishery.

Class III trout streams have no natural reproduction and require annual stocking of legal-size fish to provide sport fishing.

Cold Water Streams

Cold water streams include surface waters capable of supporting a community of cold water fish and other aquatic life, or serving as a spawning area for cold water fish species. These include but are not restricted to, surface waters identified as trout water by the WDNR (*Wisconsin Trout Streams*, PUBL 6-3600 (80)).

The Lower Chippewa Basin has numerous cold water streams throughout most of the basin. The north east part of the basin is the only area that lacks cold water resources. Cold water streams vary from high gradient coulee streams in the southwest to low gradient sandy streams in the north central part of the basin. Most contain native brook trout and/or sculpins; however both stocked and naturalized populations of brook, brown and rainbow trout can be found. White suckers and many cool water species of minnow become increasingly more abundant as mean summer stream temperatures rise. Several streams, including the Rush River, Elk Creek, Duncan and McCann Creeks, have regional and statewide significance as sport and/or trophy fisheries. Fishing pressure on popular streams in Pierce County have reached saturation levels and anglers are focusing increasing effort on lesser-known streams in the area. Water quality and habitat appear to be improving however, many streams suffer from poor water temperatures or weak spring flow, poor habitat, flooding and nonpoint source pollution from agricultural lands and urban runoff.

There are approximately 208 named trout streams in the basin, including 250 miles of Class I, 458 miles of Class II and 142 miles of Class III cold water trout streams. In addition, there are approximately 77 miles of unnamed Class I or II trout streams. These include both classified trout streams (streams that are listed in the Trout Classification Book) and unclassified trout streams (streams that are coldwater resources, but have not yet been legally classified). See Appendix 6 - Watershed Tables for the Lower Chippewa River Basin.

Warm Water Sport Fishery

These are surface waters capable of supporting a community of warm water sport fish or serving as a spawning area for warm water sport fish. The Lower Chippewa Basin has several large river systems that support warm water sport fisheries, including the Chippewa River, Red Cedar River and the Eau Claire River. Numerous tributary streams are also considered warm water sport fisheries. These rivers and streams often support abundant and diverse warm water fisheries including many highly desirable sport species such as smallmouth bass, walleye, sauger, northern pike, sturgeon and paddlefish. Rough fish, primarily redhorse, dominate these rivers and numerous species of minnows and darters may be present. Many of the warmwater tributary streams are impacted by water level fluctuations, fish passage problems or poor water quality.

The Lower Chippewa Basin has 52 named streams supporting warm water sport fisheries, including approximately 820 miles of named rivers and streams with warm water sport fisheries. See Appendix 6 - Watershed Tables for the Lower Chippewa River Basin.

Warm water forage fishery

These are surface waters capable of supporting an abundant diverse community of forage fish and other aquatic life. Numerous warm water forage streams are found throughout the basin, however most are found in the northeast part of the basin. Many are small headwater tributary streams that are too warm to support coldwater species or too small to support warmwater sport fisheries. These streams generally support highly tolerant or warm water species of fish such as brook stickleback, creek chubs, white sucker and dace. They often have poor water quality and sluggish flows. Many of these headwater streams are heavily influenced by local land uses and nonpoint source pollution is a major problem. Others suffered from large scale ditching during the mid-1900's.

The Lower Chippewa Basin has 91 named streams supporting warm water forage fisheries covering approximately 521 miles of rivers and streams. These include both classified and unclassified streams. See Appendix 6 - Watershed Tables for the Lower Chippewa River Basin.

Streams with Unknown Biological Uses

Not all streams in the Lower Chippewa River Basin have been inventoried to determine the biological life that they are capable of supporting. There are 70 named streams, including 411 stream miles, with unknown stream biological uses.

Summary of Major Resource Issues, Threats or Opportunities

Nonpoint Source Pollution: Runoff from urban and agricultural land uses is a source of water quality impairment, particularly in cold water streams. Increases in water temperature, weak spring flow, poor habitat and flooding all contribute to reduced quality of these streams. Nonpoint source pollutants also affect warmwater streams, particularly in headwater areas, where water quality is poor and flows are sluggish.

Stream Sediment Loads: Over 150 years of watershed abuse and soil erosion has lead to heavy deposition of fine sediment in many of our small warm and coldwater streambeds. Excessive bank erosion in wooded or heavily pastured areas continue today. This has resulted in the loss of deep-water fish habitat, spawning habitat and stream productivity. Measures such as bank restoration, rotational grazing, fencing and buffer strips must be taken to reduce active bank erosion and reduce the impact of fine sediment on our small stream resources.

Urbanization Impacts on Groundwater Recharge: Scattered through the basin are small coldwater streams that are impaired by urban growth and the associated increase of impervious surfaces. Groundwater withdrawals for potable and industrial use could also exacerbate the impact of development on spring flow. As impervious surface increases in a watershed, groundwater recharge and spring water outflow is reduced while floodwater flow increases. Loss of spring flow weakens coldwater temperature regimes that support coldwater fish communities and excessive flooding destroys habitat. Management of urban stormwater using Best Management Practices are important to protecting and preserving these resources.

Hydropower Peaking Operations and Thermal Impacts of Small Dams: Many of the larger streams suffer from water flow fluctuations due to hydropower peaking operations. Forage and spawning habitat is adversely affected. Many hydropower dams lack fish passage structures. As a result, fish movement is restricted. Many small dams act as a sediment trap and heat sink warming up coldwater streams to a point where the stream loses the ability to support a coldwater fish community. These dams also limit fish movement to headwater spawning areas. Modification of hydropower licenses and removal of obsolete dams can help reduce negative impacts on these stream resources.

Meeting Fishery Resource Demands: The demand for quality and quantity in our coldwater trout streams is high. Many of our streams have some of the highest fishing pressure in the state. Over crowding has lead to increased pressure on adjoining streams suffering from poor habitat and low trout populations. With over 150 years of habitat degradation and stream warming, too much reliance has been placed on stocking to maintain trout fishing opportunities. Many coldwater streams have the potential to become outstanding trout fishing resources using instream habitat improvement techniques and agricultural best management practices. Angler access concerns must be addressed through new acquisition programs.

Fish Passage: Many hydro- and non-hydropower dams within the basin prevent upstream fish passage of native fish and mussels species. Access to traditional spawning, nursery or overwintering habitat could be provided, if fish passage measures were implemented.

Lakes and Flowages and Associated Fisheries

Natural Lakes

The Lower Chippewa River basin has 299 lakes larger than 10 acres. There are also 79 named and numerous unnamed lakes less than 10 acres. Lakes between 10 and 50 acres in size comprise over 80% of the 378 named lakes. Many of these lakes are a result of the glacial history of the basin. More than 80% of the natural lakes in the basin result from glaciers that pushed down from the north, into Barron, Washburn and Chippewa Counties.

Water Quality

Water quality in lakes is influenced by the complex interaction of many watershed and lake characteristics. These include the ratio of the watershed size to the size of the lake; land uses within the lake watershed; the depth of the lake in relation to the lake surface area, the topography and geology of the watershed; and the sources of water that flow into and out of the lake. Lake water quality is measured using a number of parameters, including nutrient, chlorophyll (algae) and dissolved oxygen concentrations in the water, and water clarity. Water quality parameters have been combined to calculate a *Trophic State Index (TSI)*, for monitored lakes. More information on lake water quality can be found in *Understanding Lake Data*, UW-Extension publication # G3582.

Water quality in natural lakes and flowages in the Lower Chippewa River basin varies widely. The Trophic State Index for lakes and flowages in the basin ranges from 90 (Very Poor) in Lake Como and Tilden Millpond, to 32 (Excellent) for Pine Lake in Chippewa County. Most lakes in the Lower Chippewa Basin lie within the moderate to very poor range. See Appendix 6 - Watershed Tables for the Lower Chippewa River Basin.

The geologic and topographic characteristics of the Lower Chippewa Basin are such that few of the natural lakes are categorized as having excellent water quality. In this basin, some lakes that are classified as poor, fair or good may never the less be at or near their highest water quality potential. Good land use management practices that keep pollutant loads from reaching a lake will help maximize water quality.

Land use and shoreland development has had the most significant impacts on lake water quality and in-lake habitat. Shoreland development and agricultural land uses have contributed higher levels of nutrients resulting in increased algae populations and changes in dissolved oxygen concentrations. Shoreland development has degraded nearshore habitat on most developed lakes. Developed shorelines can be

characterized by loss of natural vegetation and removal of trees (both standing and fallen), all of which provide critical lake habitat.

Aquatic vegetation studies conducted in 1997 by Konkel, Borman, and Voss demonstrated that aquatic plant communities were degraded in front of developed shorelands. Recent research (Meyer 1997) found that certain critical habitats are eliminated and/or degraded for aquatic and terrestrial species at current approved shoreland development densities. Current shoreland development practices have been predicted to contribute about 7 times more nutrients in runoff than in runoff from undeveloped shorelands (Panuska 1994). Current watershed assessment and modeling activities indicate that agriculture is frequently a major contributor of nutrients to lakes when present in lake watersheds (Panuska 1999, Kampa 1998, Voss 1992).

Studies conducted on Lower Chippewa Basin oxbow lakes, Half-Moon Lake, Silver Birch and Lake Hallie indicate that excessive nutrient inputs have lead to significant winter low dissolved oxygen problems often requiring winter aeration to maintain fish populations (WDNR Files, Pippenger 1994).

Mercury Contamination

Of 33 lakes tested for mercury, 13 waterbodies had elevated concentrations of mercury that required fish consumption advisories. Some contaminants such as mercury, build up in the body over time and may pose reproductive risks, as well as impaired brain development and function in children and adults. Mercury is distributed throughout a fish's muscle tissue (the part that is eaten), rather than in the fat or skin. The only way to reduce mercury intake is to reduce the amount of contaminated fish consumed. See the pamphlet, *Important Health Information for People Eating Fish from Wisconsin Waters*, available at any DNR office. The pamphlet, published each year by the Wisconsin Division of Health and the WDNR, provides consumption advisories for each lake in the state.

Fishery Resources and Habitat Conditions

Largemouth bass and panfish are the predominant fishery in the basin's abundant small to mid-size lakes (Table 2). Major panfish species include bluegill, black crappie and yellow perch. Northern pike provide the second-most abundant fishery. Lakes in Barron, Chippewa and Washburn Counties comprise approximately 86% of the bass/panfish and northern pike lakes. Walleye are present in 34 lakes, primarily in Barron and Washburn Counties. Few lakes provide fisheries for musky, smallmouth bass and trout. Musky and trout fisheries are supported through stocking programs. Many small, shallow lakes are subject to winterkill conditions and provide little or no fishery to the public.

Residential development along many mid- and large-size lakes has degraded much of the natural shoreline habitat, and the benefits and values of natural shorelines to wildlife, fish and water quality have been lost. Development and recreational uses have also affected shallow water habitat. Important woody cover and aquatic plant beds have been lost in spawning, nursery and feeding areas that support fish populations.

Many smaller lakes retain good to excellent shoreline and shallow water habitat due to a lack of development and low recreational use.

Table 2. Number of Natural Lakes with Various Fisheries

Number of Natural Lakes With Various Fisheries in the Lower Chippewa River Basin									
County	Musky	Walleye	Small-mouth Bass	Northern Pike	Trout	Lake Sturgeon	Cat-fish	Large-mouth Bass & Panfish	Panfish Only
Barron	1	15	4	54	2			59	13
Buffalo				2				2	
Chippewa	1	4		39	1			57	16
Clark									
Dunn									
Eau Claire		1		1				1	
Pepin		1		3			1	3	
Pierce									
Rusk				4				6	
St. Croix									
Sawyer		2		3	1			11	
Taylor		1		6	1			6	5
Washburn		10	1	26	1			68	2
Totals	2	34	5	138	6		1	213	36

Aquatic plant populations

Aquatic plant surveys have been conducted on 15 natural lakes in the Lower Chippewa Basin: Silver Birch, Lower Turtle, Axehandle, Chetek, Mud, Pokegama, Prairie, Ten Mile, Bear, Half Moon, Old Elk, Pine, Cornell, Finley, and Town Line (Table 3). Results of the surveys reflect the natural differences between lakes as well as the impacts from human activities. The table below summarizes several parameters that can indicate the health of the aquatic plant community.

The maximum depth at which rooted aquatic vegetation occurs in the lakes in the basin ranges from 5.3-30 feet (of the 15 that were surveyed). This indicates a wide range of conditions that control light penetration (Table 3).

The number of plant species recorded in each lake ranges from 12 to 42. The diversity of plant species in individual lakes measures not only the number of plant species, but how well balanced the abundance and distribution of those species are in relation to one another. A diverse plant community will support a more diverse fish and wildlife community. The plant diversity in natural lakes of the Lower Chippewa Basin ranges from fair to excellent, with four lakes having excellent diversity (Table 3). *Some lakes in the table did not have surveys with complete data that could be used to calculate diversity, % of the littoral zone vegetated, disturbance and overall quality.*

Disturbance in the plant community can come from many sources: recreational use, shoreline and near-shore development, fluctuating water levels, methods employed to manage the aquatic plant community, and introduction of exotic species. Three lakes (Table 3) have plant communities indicative of high levels of disturbance. Impacts from development, exotic species, management of exotic species and agricultural land use are the most likely causes for the disturbance in these plant communities. Four lakes have plant communities indicative of very low disturbance.

Exotic species can have a detrimental impact on the plant community if they increase at the expense of the native plant species. Nine natural lakes of the Lower Chippewa Basin are colonized by the exotic species, curly-leaf pondweed. Eurasian water milfoil has been found only in Beaver Dam Lake in the Lower Chippewa Basin.

Of the Lower Chippewa Basin natural lakes, Pike Lake, Cornell Lake and Town Line Lake have high quality plant communities; these lakes have excellent diversity, very low disturbance and no exotic species. Silver Birch Lake has a lower quality plant community: a lower maximum rooting depth, high disturbance and colonization by exotic species. The lake is impacted by heavy growth of non-native curly-leaf pondweed that dies back in the middle of the summer. Finley Lake has a low quality aquatic plant community: low diversity and high disturbance. Finley Lake is likely impacted by the heavy agricultural use, without any buffer, along one shoreline.

Table 3. Aquatic Plant Community Characteristics in Natural Lakes

Lake	Sub-Basin	Maximum Depth of Rooted Plants (ft.)	# Species Present	Species Diversity ¹	% of Littoral Zone Vegetated ²	Plant Community Disturbance ³	Exotic Species Present ⁴
Silver Birch	LC02	6.0	28	Excellent	75%	High	CLP
Beaver Dam	LC05						EWM
Turtle, Lower	LC05	8.0	17				CLP
Axhandle	LC08	30.0.	31	Good	92%	Very low	
Chetek	LC08	5.8	16				CLP
Mud	LC08	5.3	16				CLP
Pokegama	LC08	5.6	12				CLP
Prairie	LC08	6.5	15				CLP
Ten Mile	LC08	5.4	23				CLP
Bear	LC10	11.0	42				CLP
Half Moon	LC13	9.0	32	Good	100%	High	CLP
Old Elk	LC13		16			Low	
Pike	LC19	14.0.	31	Excellent	86	Very low	
Cornell	LC21	14.5	41	Excellent	93%	Very low	
Finley	LC21	8.0	20	Fair	50%	High	
Town Line	LC21	10.5.	35	Excellent	80%	Very low	

Species Diversity¹: Species diversity is a measure of the complexity of the plant community.

% of Littoral Zone Vegetated²: 45-85% is considered ideal for providing habitat for aquatic life.

Plant Community Disturbance³: Plant community disturbance is measured by calculating the abundance of species that are sensitive to disturbance and the abundance of species that are tolerant of disturbance.

Exotic Species⁴: CLP – Curly-leaf pondweed

EWM – Eurasian watermilfoil

Some lakes in the table did not have surveys with complete data that could be used to calculate diversity, % of the littoral zone vegetated, and disturbance.

Aquatic Plant Management

Chemical treatments of nuisance aquatic plants are not currently being conducted on any of the lakes in the Lower Chippewa Basin.

Half Moon Lake and Silver Birch Lake are two oxbow lakes of the Chippewa River that are colonized by nuisance levels of curly-leaf pondweed, an exotic submergent species. The City of Eau Claire developed an approved lake management plan to conduct a harvesting program on Half Moon Lake. Mechanical harvesting is conducted to remove excessive levels of the exotic aquatic plant species. The residents of Silver Birch Lake are considering a harvesting program.

Beaver Dam Lake is colonized by nuisance levels of Eurasian water milfoil, an exotic submergent species. The Beaver Dam Lake District applied for and received a Lake Planning grant (LPL-400) to use weevils to control Eurasian water milfoil. The grant was approved in Fall 1996, with weevils introduced to the lake in April 1997. The Lake District and their consultant (Barr Engineering) are exploring additional control methods (pers. comm. Dan Ryan, DNR/NOR).

Resource Issues, Threats and Opportunities

Shoreland Development and Shoreland Habitat Loss: Development is the greatest factor affecting the quality and quantity of shoreline habitat. The degradation of shoreline habitat affects the natural transition from terrestrial to aquatic habitat, and in turn the quality of shallow water habitat. It also results in increased nutrient inputs by increasing the amount of runoff generated on the shoreland.

Nonpoint Source Pollution from Land Uses: Runoff from development and agricultural practices affects water quality and aquatic habitat conditions.

Recreational Impacts: Recreational users continue to put increasing pressure on our lake resources, at times causing conflicts between various users. Boating can also have detrimental water quality impacts in shallow areas (ACOE 2001) (Asplund 1996)

Meeting Fishery Resource Demands: A demand for quality and quantity in our fisheries is high. With degradation of spawning habitat, too much reliance is placed on stocking to maintain certain fisheries. Mercury contamination of fish is a problem for the consumer. In addition, many small lakes experience low dissolved oxygen levels in winter and without some form of aeration, they are limited in the aquatic life they can sustain.

Lakes Classification and Shoreland Zoning Initiatives: As the impact of development on lakes becomes evident, many counties, particularly in Northern Wisconsin, have undertaken lake classification initiatives. Lakes are assessed and categorized based on factors including size, current level of development, water quality and susceptibility to water quality degradation. Lake classification is utilized to update county shoreland zoning ordinances, to provide greater lake protection for identified sensitive lakes through appropriate development controls. Lake classification was initiated in Chippewa County in 1999. The County is currently evaluating proposed modifications to its existing Shoreland Zoning ordinance. Barron County completed a lake classification process in November 2000.

Flowages

The Lower Chippewa River basin has 69 flowages, which provide approximately 71% of the total acres of lake resources in the basin. Approximately 46% of these are larger than 100 acres, and 28% are larger than 500 acres. Barron and Chippewa Counties contain over 50% of the number and total acres of flowages in the basin. In Clark and Pierce County, flowages are the only lake resources present. Flowages also provide a majority of the lake resources in Dunn and Eau Claire Counties. Many of the

smaller flowages (less than 50 acres) were created as shallow water impoundments for waterfowl production.

Six flowages on the Chippewa River within the Lower Chippewa Basin are the result of hydropower dams. One of these, Lake Wissota, is the largest water body in the basin. Numerous other flowages on basin streams and tributaries were created when dams were constructed for millponds, logging, and smaller sources of hydropower. Many of these dams remain in place, although they are no longer being used for their original purpose.

Water quality

Water quality in flowages is affected by many of the same factors that affect water quality in natural lakes and often to a greater degree. In general, flowages receive runoff from large drainage areas, and often receive heavy loads of nutrients and other pollutants. The degree to which these pollutants are manifested in water quality degradation often depends on how long water is retained in the flowage.

Sediment deposition is frequently a serious problem in flowages, because heavy sediment loads in the rivers will settle out in the impoundment as the water velocity decreases. This sediment deposition may become a navigational impairment as well as a nutrient load in the impoundment.

Water quality in natural lakes and flowages in the Lower Chippewa River basin varies widely. The Trophic State Index for lakes and flowages in the basin ranges from 90 (Very Poor) in Lake Como and Tilden Millpond, to 32 (Excellent) for Pine Lake in Chippewa County. Most lakes in the Lower Chippewa Basin lie within the moderate to very poor range. See Appendix 6 - Watershed Tables for the Lower Chippewa River Basin.

Comprehensive lake ecosystem assessments have been completed on Lake Wissota, Tainter Lake, Lake Eau Claire, Coon Fork Lake and Lake Altoona. Nutrient inputs from agricultural land use, high bacteria levels, internal nutrient loads, and excessive sedimentation and algae blooms have been identified as significant water quality problems. Comprehensive management strategies are in various stages of development for these waterbodies.

Mercury Contamination

Of 18 flowages tested for mercury, eight have fish consumption advisories. Contaminants such as mercury build up in the body over time and may pose reproductive risks, as well as impaired brain development and function in children and adults. Mercury is distributed throughout a fish's muscle tissue (the part that is eaten), rather than in the fat or skin. The only way to reduce mercury intake is to reduce consumption of contaminated fish. See the pamphlet, *Important Health Information for People Eating Fish from Wisconsin Waters*, available at any DNR office. The pamphlet, published each year by the Wisconsin Division of Health and the WDNR, provides consumption advisories for each lake in the state.

Fishery resources and habitat conditions

Largemouth bass, panfish and northern pike are the predominant fisheries in flowages (Table 4). Walleye are found primarily in flowages of the larger rivers – the Red Cedar, Eau Claire and Chippewa Rivers. Flowages provide a majority of the musky fisheries. Muskies are dependent on stocking to maintain fishable populations. Approximately 82% of smallmouth bass populations are found in flowages. As with walleye, they are found primarily in flowages on large rivers. Trout are present mainly as incidental fish in flowages created on trout streams and provide a limited fishery. Lake sturgeon and catfish are found in flowages of the Chippewa River in Chippewa and Eau Claire Counties.

As with natural lakes, shoreline and shallow water habitat is being degraded due to shoreline development, water quality changes and recreational users. Poor land use practices in the watersheds of flowages further increase levels of water quality degradation and sedimentation. Many flowages or portions of flowages have become over-fertile from runoff pollution in the watershed.

Table 4. Number of Flowages with Various Fisheries

Number of Flowages With Various Fisheries in the Lower Chippewa River Basin									
County	Musky	Walleye	Small-mouth Bass	Northern Pike	Trout	Lake Sturgeon	Cat-fish	Large-mouth Bass & Panfish	Panfish Only
Barron	3	10	9	17	3			16	3
Buffalo									
Chippewa	4	5	5	14	2	4	4	13	1
Clark	1	1	1	1				2	
Dunn		2	2	3	2			5	
Eau Claire	4	3	3	4	1	1	1	7	
Pepin									
Pierce		1			1			2	
Rusk				2				2	1
St. Croix					1			1	
Sawyer		1	1	1				1	
Taylor				1				1	
Washburn		2	2	3				3	
Totals	12	25	23	46	10	5	5	53	5

Source: WDNR WCR Fisheries Biologists

Aquatic plant populations

Aquatic plant surveys have been conducted on 20 flowages in the Lower Chippewa Basin (Table 5). Results of the surveys reflect the natural differences between flowages, as well as the impacts from human activities. The table below summarizes several parameters that can indicate the health of the aquatic plant community.

The maximum depth at which rooted aquatic vegetation occurs in the flowages in the basin ranges from 4.0-12.0 feet (of 19 that were surveyed). This indicates a wide range of conditions that control light penetration (Table 5).

The number of plant species recorded in each flowage ranges from 7 to 35. The diversity of plant species in individual flowages measures not only the number of plant species, but also how well balanced the abundance and distribution of those species are in relation to one another. A diverse plant community is more complex in structure and will support a more diverse fish and wildlife community. The plant diversity in flowages of the Lower Chippewa Basin ranges from fair to excellent, with three lakes having excellent diversity (Table 5). *Some flowages in the table did not have surveys with complete data that could be used to calculate diversity, % of the littoral zone vegetated, disturbance and overall quality.*

Disturbance in the plant community can come from many sources: recreational use, shoreline and near-shore development, fluctuating water levels, methods employed to manage the aquatic plant community, and introduction of exotic species. Eight flowages (Table 5) have plant communities indicative of high levels of disturbance. Impacts from development, exotic species, plant management and agricultural land use are the most likely causes for the disturbance in these plant communities. One flowage has a plant community indicative of very low disturbance.

Exotic species can have a detrimental impact on the plant community if they increase at the expense of the native plant species. Twelve flowages in the Lower Chippewa Basin are colonized by the exotic species, curly-leaf pondweed. Eurasian water milfoil has not been found in any of the flowages of the Lower Chippewa Basin. Purple loosestrife occurs in scattered locations along the Chippewa River and its flowages.

Of the Lower Chippewa Basin flowages, Rock Dam Lake has high quality plant community due to its excellent diversity, very low disturbance and lack of exotic species. Rock Dam Lake is a small flowage with abundant forest in its watershed.

Table 5. Aquatic Plant Community Characteristics in Flowages

Flowage	Sub-Basin	Maximum Depth of Rooted Plants (ft.)	# Species Present	Species Diversity ¹	% of Littoral Zone Vegetated ²	Plant Community Disturbance ³	Exotic Species Present ⁴
Nugget Lake	LC02	12.0	10	Fair	77	High	CLP
Menomin	LC04	7.5	18	Good	50	Above Average	CLP
Tainter	LC04	7.5	21	Good	26	Above Average	CLP
Glenn Lake	LC06	11.0.	19	Good	76	Above Average	
Rice	LC10	11.0	15				CLP
Altoona	LC14	8.5	19	Good	37	Above Average	CLP
Dells Mill	LC14	4.0					
Coon Fork	LC15	6.5	20	Good	43	High	
Fairchild Pond	LC15	6.5	7			High	
Mead Lake	LC16	9.0	22	Good	44	High	CLP
Rock Dam	LC16	7.0	23	Excellent	51	Very Low	
Como Lake	LC18	6.0	10	Fair	93	High	
Dells Pond	LC18		27			Low	CLP
Glen Loch	LC18	7.0	15	Fair	88	High	
Lake Hallie	LC18	12.0	26	Good	94	High	CLP
Tilden Mill	LC18	8.0	12	Fair	100	High	
Otter Lake	LC19	11.0	35	Excellent	65	Above Average	CLP
Marshmiller	LC21	7.0	25	Excellent	74	Low	CLP
Wissota	LC21	7.5	31	Good	30	Low	CLP
Old Abe	LC21	8.0	18	Fair	27	Above Average	CLP

Species Diversity¹: Species diversity is a measure of the complexity of the plant community.

% of Littoral Zone Vegetated²: 45-85% is considered ideal for providing habitat for aquatic life.

Plant Community Disturbance³: Plant community disturbance is measured by calculating the abundance of species that are sensitive to disturbance and the abundance of species that are tolerant of disturbance.

Exotic Species⁴: CLP – Curly-leaf pondweed

Some lakes in the table did not have surveys with complete data that could be used to calculate diversity, % of the littoral zone vegetated, and disturbance.

Aquatic Plant Management

Chemical treatments of nuisance aquatic plants are not currently being conducted on any of the lakes in the Lower Chippewa Basin. However, chemical treatments with a glyphosate product are being conducted below the Jim Falls Dam and the Cornell Dam to control purple loosestrife. Purple loosestrife is an exotic emergent plant species that is found on lakeshores, wetlands and sometimes upland areas.

Nugget Lake developed a harvesting plan and is currently controlling nuisance aquatic plant growth with a mechanical harvester.

Lake Altoona and Lake Wissota have placed sediment screens in limited areas around private docks to prevent nuisance growth of aquatic plants.

Resource Issues, Threats and Opportunities

Limiting factors and problems associated with flowages are similar to those identified for natural lakes. Additional concerns related to flowages are described below.

Nonpoint pollutants: Nutrients and sediment loads from land use practices in watersheds of flowages can have severe impacts. Several flowages in the Lower Chippewa Basin suffer exceedingly poor water quality due to these pollutant loads. Heavy sediment deposition to impoundments exacerbates water quality problems. Mercury contamination of fish is slightly higher in flowages. Fish consumption advisories are present on 44% of the waters tested.

Fluctuating Water Levels: A small number of flowages in the basin are used for hydropower generation. Pronounced water level fluctuations and drawdowns of flowages can have negative impacts on fish populations, aquatic invertebrate populations, aquatic plant communities and aquatic habitat, in particular shallow water habitat. Winter drawdowns have been found to decrease aquatic invertebrate populations (Delong and Mindel 1993) and degrade aquatic plant communities (Borman 1991). Impacts of such fluctuations can be more pronounced in flowages associated with hydropower generation if water levels are radically fluctuated. Fluctuations that occur during the spawning period can have negative impacts on spawning activity, egg survival and the early life stages of fish.

Dams and Floodplains

Large Dams

Large dams are defined as having a structural height of over 6 feet and impounding more than 50 acre-feet or having a structural height of over 25 feet and impounding more than 15 acre-feet. Since 1986 Chapter 31.19 requires the Department to inspect large dams on navigable waterways once every 10 years unless they are owned or regulated by a federal agency and are exempt from state inspection.

Approximately 104 large dams exist in the Lower Chippewa Basin. Of these:

- 14 are federally regulated

- 27 (largely high hazard structures) have been inspected once since 1986
- 10 have been re-inspected
- 63 dams remain to be inspected the first time. About 50% of these are suspected as being on non-navigable streams and would no longer be part of the inspection program.

At this time the majority, if not all, of the dams that remain to be inspected fall into the low hazard classification because of no residential development downstream of the dams. To secure a low hazard classification the dam owner would need a dam break analysis and proper zoning downstream.

Small Dams

Small dams are defined as having a structural height of less than 6 feet, and impounding no more than 50 acre-feet or having a height of less than 25 feet and impounding less than 15 acre-feet. No safety inspection is required for small dams, however the dam owner is required to maintain the dam in a safe condition. In cases of a change in ownership, the dam and owner must meet certain requirements. If citizen complaints or concerns are received, the DNR has the authority to require the dam owner to repair or remove the dam if it is not meeting standards. The dam owner must also notify the Department and have a plan approval before proceeding with any modifications, repairs, or removals.

Approximately 295 small dams exist in the Lower Chippewa Basin. Many of these dams were abandoned years ago, but have not been properly removed. Many others are no longer serving their intended use and are in need of repair or removal.

Hydropower Dams

Dams in the United States that are used for energy production or “hydropower” are regulated by the Federal Energy Regulatory Commission (FERC) under the Federal Power Act. There are nine hydropower dams within the Lower Chippewa River Basin. Six are located on the Chippewa River, two on the Red Cedar River and one on the Eau Galle River.

In general, most hydropower facilities are operated by two methods, either run-of-river or peaking. A peaking plant stores water behind the dam for release during peak periods of the day when energy demand is higher. A run-of-river facility runs on a continuous basis, or whenever enough flow exists to run the turbines. The run-of-river operation allows for similar water flows in the river upstream and downstream of the dam. The Lower Chippewa River basin has both types of facilities. Currently there are five facilities up for re-licensing in the basin. Re-licensing efforts have been underway on three projects on the Chippewa River since 1995. Consultation on the two Red Cedar River projects started in June of 2000.

Floodplains

All municipalities with land in a floodplain are required to adopt a Floodplain Ordinance, which restricts the type of building that can occur on floodplains. Counties with floodplains are also required to have a Floodplain Ordinance and lands outside of a municipality but within that county need to following zoning laws required by the ordinance. Table 6 provides information on municipalities with current floodplain zoning ordinances.

Table 6 Communities with Floodplains

Community	County	Watershed Code	Ordinance date/need¹	Flooding Problems²	Mapping Needs³	Comments
Almana	Barron	LC05			7/15/88	
Barron		LC09			9/29/89	
Cameron		LC09	UN		UN	OUTSIDE WCR

Chetek		LC08			6/3/86	
Prairie Farm		LC05			5/15/86	
Rice Lake		LC10			4/1/82	
Bloomer	Chippewa	LC18		SIG	UN	
Cadott		LC19		MIN/ LDP	3/5/96	
Chippewa Falls		LC18		SIG	UN-Fed	
Cornell		LC21		MIN	9/28/90	
New Auburn		LC07,18	UN	MIN	UN	
Stanley		LC17	UN	SIG	UN	
Thorp	Clark	LC17		MIN	8/15/84	NOT LC COUNTY
Boyceville	Dunn	LC06		SIG	UN	
Colfax		LC07		MOD		
Downing		LC06	UN	MOD		
Elk Mound		LC13		NIF/ LDP	?	
Knapp		LC04	UN	MIN	UN	
Wheeler		LC05				
Menomonie		LC04	UN	MIN		
Altoona	Eau Claire	LC14,25		MIN	UN-Fed	
Augusta		LC14		SIG/ LDP	UN	
Eau Claire		LC13,24,1 8,25,14		SIG/ LDP	UN	
Fairchild		LC15	UN	MIN	UN	
Fall Creek		LC14		MIN	UN	
Durand	Pepin	LC01		SIG		
Pepin		LC22		MIN	UN-Fed	
Stockholm		LC22		MIN		
Bay City	Pierce	LC23		SIG		
Ellsworth		LC23		SIG		
Elmwood		LC03		MOD		
Maiden Rock		LC22	UN	SIG	UN	
Plum City		LC02		SIG		
Spring Valley		LC03		SIG		
Prescott		LC23		SIG	UN-Fed	
Baldwin	St. Croix	LC22		SIG	UN	
Wilson		LC04				
Woodville		LC03	UN	MOD	UN	
Glenwood City		LC06		MOD		
Gilman	Taylor	LC20			1/15/89	
Lublin		LC17		NIF	?	OUTSIDE WCR
Birchwood	Washburn	LC11			9/30/88	

¹Date shown is most recent update of ordinance. **UN** means an ordinance update is needed.

²**SIG** - Significant; **MOD** – Moderate; **MIN** - Minor; **LDP** - Localized Drainage Problems

³Date shown is most recent map update (or OK means maps are up to date); **UN** means a map update is needed. **UN-Fed** means that FEMA needs to update the current flood insurance map

Issues, Threats and Opportunities Related to Dams

- Staffing Limitations. Since 1986, inspection of large dams is required every 10 years. Due to staffing limitations, the inspection of all dams in the first 10 years has not been completed. Some dams that were inspected during the first 10 years are now due to be re-inspected.

- Inventory needs. Existing information about dams within the Lower Chippewa Basin is scattered among offices, and needs to be brought together to develop a working dams database. In addition, there is a lack of field data to determine the environmental impacts of many of the dams. This information is needed in order to establish priorities within the basin for conducting dam management activities.
- Social issues related to dam removal or repair decisions. As dams age, they often cease to be used for their original purposes. Communities that have grown up around these dams and impoundments face difficult dam removal and repair decisions that include environmental, social and economic considerations. This presents both a need and an opportunity for the Department to provide timely information to communities as they proceed with decision making processes.
- Funding opportunities. (Rivers Alliance, Rivers Grants Initiative)
- Grade Control Structures
- Stormwater Detention Basins

Drinking and Groundwater

Groundwater Use in the Lower Chippewa River Basin

Basin residents rely entirely on groundwater for drinking water. The rural population generally depends on shallower, less protected aquifers than the urban population served by public water supplies. Most groundwater in the state is consumed by residential users for such needs as drinking water, cleaning, and sanitary purposes. Industry is the next largest groundwater consumer, followed by irrigation.

Water distribution is governed by the hydrologic or water cycle, which is kept in motion by solar energy and gravity. As rain falls to earth, some flows downhill as runoff to streams, lakes or oceans. Some evaporates; plants take up some. The rest trickles down through surface soil and rock. This water becomes groundwater. Groundwater is discharged into surface water bodies such as wetlands, lakes and streams – the low places where groundwater meets the land surface. When there is development, large areas are paved over. This decreases the area within a watershed where rain can infiltrate to the groundwater. The result is increased over land flow to surface water bodies. Flooding, increased sedimentation of streambeds, increased stream temperature and degradation of stream habitat will result.

Potential for Groundwater Contamination

The potential for groundwater contamination is determined by land use practices applied to an area in conjunction with the physical setting. The “physical setting” of an area includes, but is not limited to, soil type and thickness, presence of glacial sediments such as sand and gravel, depth to bedrock, depth to groundwater, and topography.

Groundwater in the Lower Chippewa Basin comes from 3 types of aquifers (rock or sediment layers saturated with water): sand and gravel, dolomite and sandstone. The sand and gravel aquifer is the uppermost layer and consists of sand and gravel deposited by a retreating glacier or glacial sediments which have been reworked and deposited in river beds. It is present in the northeast portion of the basin including Taylor, Rusk and Sawyer counties and south of Chain Lake to Chippewa Falls and west of Stanley in Chippewa County. The rest of the basin is located in the driftless area, an area of the state where the sand and gravel aquifer is present in major stream valleys only. Because the sand and gravel aquifer is close to surface sources of pollution, it can be easily contaminated.

In Pierce and St. Croix counties the dolomite aquifer underlies the sand and gravel aquifer. Dolomite bedrock is highly fractured and this area of the basin has many sinkholes and other karst features.

Well-developed horizontal and vertical crevices increase the potential for groundwater contamination by providing direct conduits from surface sources of pollution to the groundwater. Over time cracks and crevices are enlarged by rain water which is slightly acidic. As these crevices enlarge over time they collapse and sinkholes or collapse features are formed. Flooding can cause sinkholes to form in streambeds leading to disappearing streams. One such sinkhole developed in Isabelle creek (LC23) three miles downstream of the Ellsworth wastewater treatment plant outfall in September 1992. The creek was rerouted around the sinkhole until it could be properly closed in July, 1993. Sinkholes were also documented in the Rush River (LC22) about two miles downstream of the Baldwin wastewater treatment plant discharge (Boettcher, 1993). No action was necessary to fix the sinkholes although nearby wells are monitored.

Groundwater Ranking in Watersheds

All watersheds in the state were ranked for groundwater contamination potential by the Drinking and Groundwater Section of the WDNR in 2000 (Laura Chern, pers. comm.). The ranking is based on percent of urban and rural land use, the presence of confined animal feeding operations (CAFO's) and sample analytical data for nitrate and pesticides from private wells. Groundwater contamination potential ranked from a high of 103 to a low of almost 0. In general, those watersheds that scored high (above 30) had a large percentage of rural or heavy urban land use coverage and groundwater analytical data showing that private wells had nitrate and/or pesticide contamination.

In the Lower Chippewa Basin the scores range from 5.42 to 63.90 with an average score of 39.52. The table below shows the score for each watershed within the basin.

Table 7. Groundwater Ranking in Watersheds

Watershed Name¹	ID #	Total Urban %	Total Agric. %	Nitrate ES² Score	NO₃ PAL³ Score	Pesticide Score	# CAFO's	Urban Score	Rural Score	Total Score
Bear Creek	LC01	0.36	28.132	0	0	2		0.36	30.132	30.49
Plum Creek	LC02	0.07	33.998	0	0	0		0.07	33.998	34.06
Eau Galle River	LC03	0.20	40.309	0	0	0		0.20	40.309	40.51
Wilson Creek	LC04	1.45	37.604	0	0	0		1.45	37.604	39.05
Hay River	LC05	0.31	33.717	7	3	0	4	0.31	47.717	48.03
South Fork Hay River	LC06	0.19	33.375	7	5	0		0.19	45.375	45.56
Pine Creek and Red Cedar River	LC07	0.24	35.5	0	0	0	3	0.24	38.5	38.74
Lake Chetek	LC08	0.29	26.237	10	3	0	4	0.29	43.237	43.52
Yellow River	LC09	0.42	45.479	7	5	0	6	0.42	63.479	63.90
Brill and Red Cedar Rivers	LC10	0.92	24.752	7	3	0	1	0.93	35.752	36.68
Red Cedar Lake	LC11	0.10	5.318	0	0	0		0.10	5.318	5.42
Muddy and Elk Creeks	LC13	1.78	44.317	10	3	3	1	1.78	61.317	63.10
Lower Eau Claire River	LC14	0.76	33.984	7	5	3		0.76	48.984	49.75
Black and Hay Creeks	LC15	0.16	20.866	0	0	0		0.16	20.866	21.03
South Fork Eau Claire River	LC16	0.00	25.6	0	0	0		0.00	25.6	25.60
North Fork Eau Claire River	LC17	0.55	43.113	0	0	0		0.55	43.113	43.66

Duncan Creek	LC18	5.36	43.011	7	5	3		5.43	58.011	63.44
Lower Yellow (Chippewa Co.) River	LC19	0.18	38.949	0	0	0		0.18	38.949	39.13
Upper Yellow (Wood Co.) River	LC20	0.00	14.976	0	0	0		0.00	14.976	14.98
McCann Creek and Fisher River	LC21	0.19	28.953	0	0	0		0.19	28.953	29.14
Rush River	LC22	0.32	42.933	0	0	3	1	0.32	46.933	47.25
Trimbelle River and Isabelle Creek	LC23	0.63	45.238	0	0	0		0.63	45.238	45.86
Lowes and Rock Creeks	LC24	2.09	30.13	0	0	0		2.10	30.13	32.23
Otter Creek	LC25	7.46	39.735	0	0	0		7.62	39.735	47.36

Source: WDNR Drinking and Groundwater Section

¹Watersheds in **bold** are ranked high for groundwater contamination potential

²**Enforcement Standard (ES) Health Advisory Level:** The concentration of a substance at which a facility regulated by COM, DATCP, DOT or WDNR must take action to reduce the Concentration of the substance in the groundwater.

³**Preventive Action Limit (PAL):** A lower concentration of a contaminant than the Enforcement Standard. The PAL serves to inform the WDNR of potential groundwater contamination problems.

Summary of Groundwater Contaminant Sources in the Basin

The Bureau of Remediation and Redevelopment of the DNR has primary responsibility for identifying contaminated sites, tracking cleanup progress, and approving cleanup measures for groundwater contamination cases where contamination is either moving offsite or a drinking water well has been impacted. As of September 2000, 139 groundwater or potential groundwater contamination sources have been identified within the basin. Of these, 20 are landfills, 12 are pesticide contamination sites and four are battery dumpsites. The remaining 103 were from varied sources. In addition, a tracking system for the Leaking Underground Storage Tank (LUST) Program identifies 318 sites in the basin actively being pursued for cleanup measures. The Remediation and Redevelopment Program does share responsibility for investigating contamination sites with Department of Commerce for certain LUST sites, with Department of Agriculture, Trade and Consumer Protection for certain pesticide contaminated sites and with Department of Transportation for road salt contaminated sites.

Summary of Contaminants in Public and Private Wells

Bacteria: Bacteria are the most frequent cause of contamination for individual wells. Bacterial contamination can occur almost anywhere in the basin, and may be caused by improperly constructed or deteriorating wells, thin soils or fractured bedrock, and flooding of wells. Though bacteria are abundant in the environment, bacteriological problems can be avoided if wells are both constructed and located in compliance with the Wisconsin Well Code, NR 112. Six of the public water supply systems in the Lower Chippewa Basin tested positive for coliform bacteria in 1999. These facilities include Altoona, Bloomer, Chippewa Falls, Cornell, Eau Claire, and New Auburn. (per table Chern)

Nitrates and Pesticides

Table 8 below shows nitrate data from private potable and public wells and pesticide data from private potable wells in the Lower Chippewa basin. Data is from the Groundwater Retrieval Network, which includes data collected from 1993 until the present.

Nitrate data collected in the basin (1114 public and private wells) shows that 15% of samples exceeded the 10 part per million (ppm) drinking water and groundwater enforcement standard (ES). The groundwater preventive action limit (PAL) of 2 ppm was exceeded in 58% of the samples. Elevated nitrate concentrations can be the result of over-application of manure and other fertilizers, sludge and wastewater spreading; on-site waste disposal systems; a high density of waste disposal systems; manure storage; animal feedlots; or the improper location or construction of wells.

Pesticide data collected in the basin shows that 6% of samples had detectable pesticide levels less than the preventive action limit, 1% of samples exceeded the preventive action limit, and 0.12% of samples exceeded the enforcement standard for pesticides.

Pesticide-contaminated wells are frequently found near pesticide mixing facilities. Some wells are not near pesticide facilities but are contaminated with detectable levels of atrazine, a corn herbicide; these detections are usually below the health standard of 3.0 micrograms per liter (ug/l) (DNR-GRN).

Public water supply systems must be tested for synthetic organic compounds, including most pesticides and atrazine. None of the public water supply wells in the basin have been found to contain levels of pesticides that exceed enforcement standards.

In March 1989, a municipal well in the city of Augusta in the Lower Eau Claire River watershed (LC15) tested positive for pesticides. A local mixing and loading facility was the source. Several monitoring wells have been installed to define the extent of the contaminant plume. These monitoring wells were also used to document the effect on the contaminant plume of pumping the municipal well. During the study to define the extent of pesticides, gasoline turned up in some monitoring wells. All affected parties have worked cooperatively to clean up and solve this contamination problem. Thus far, some contaminated soil has been removed. The city no longer uses the contaminated well. Further cleanup is planned. The DATCP has been designated the lead agency for pesticide spills and is now handling this case.

Both municipal wells in the city of Ellsworth in the Trimbelle River and Isabelle Creek watershed (LC24) contain low levels of atrazine, alachlor and metolachlor. No source has yet been implicated. In June 1994, one of these wells was being considered for closure due to atrazine levels of 3.1 ug/l. However, since 1994, concentrations of atrazine have declined to 1.1 ug/l.

Similarly, a municipal well in the village of Boyd tested positive for pesticides in the early 1990's. The well was abandoned and replaced with a new well in a different location. The source of the pesticide was never determined. The DATCP has been designated the lead agency for pesticide spills and is now handling the case.

Table 8. Nitrate and Pesticide Contaminants in Wells

Watershed Name	ID #	# wells sampled for NO3	# samples >= ES¹ for NO3	# samples >= PAL² for NO3	# pesticide samples	# pesticide detections
Bear Creek	LC01-262	78	8	34	417	27
Plum Creek	LC02-262	42	6	18	179	19
Eau Galle River	LC03-262	107	3	43	684	39
Wilson Creek	LC04-262	107	1	47	997	56
Hay River	LC05-262	194	5	67	625	30
South Fork Hay River	LC06-262	224	25	142	161	5
Pine Creek and Red Cedar River	LC07-262	130	11	81	354	10
Lake Chetek	LC08-262	380	63	239	1323	19
Yellow River	LC09-262	511	67	299	359	15
Brill and Red Cedar Rivers	LC10-262	345	14	126	277	7
Red Cedar Lake	LC11-262	115	1	8	70	1
Muddy and Elk Creeks	LC13-262	104	27	73	843	39
Lower Eau Claire River	LC14-262	117	4	74	1332	118
Black and Hay Creeks	LC15-262	38	1	26	160	18
South Fork Eau Claire River	LC16-262	50	0	21	10	1
North Fork Eau Claire River	LC17-262	87	1	18	523	28
Duncan Creek	LC18-262	484	52	346	1441	134
Lower Yellow (Chippewa Co.) River	LC19-262	120	18	86	454	12
Upper Yellow (Wood Co.) River	LC20-262	39	0	1	135	0
McCann Creek and Fisher River	LC21-262	139	14	61	164	8
Rush River	LC22-262	114	4	78	569	59
Trimble River and Isabelle Creek	LC23-262	126	19	93	661	77
Lowes and Rock Creeks	LC24-262	5	1	3	70	4
Otter Creek	LC25-262	3	0	3	9	3

Source: WDNR Drinking and Groundwater Section

¹**Enforcement Standard (ES) Health Advisory Level:** The concentration of a substance at which a facility regulated by COM, DATCP, DOT or WDNR must take action to reduce the Concentration of the substance in the groundwater. The ES for nitrates is 10 ppm.

²**Preventive Action Limit (PAL):** A lower concentration of a contaminant than the Enforcement Standard. The PAL serves to inform the WDNR of potential groundwater contamination problems. The PAL for nitrates is 2 ppm.

Volatile Organic Compounds (VOCs): VOCs are a group of commonly used chemicals that evaporate, or volatilize, when exposed to air. VOCs occur in fuels, degreasers, solvents, polishes, cosmetics, drugs, and dry cleaning solutions. They turn up at service stations; machine, print, and paint shops; electronics and chemical plants; dry cleaning establishments; and private homes from household products. Common VOCs include tetrachloroethylene, benzene, and toluene. In the Lower Chippewa River Basin, VOC contamination occurs at the 318 leaking underground storage tank (LUST) sites, most of which are landfills and industrial areas, and 0.2 percent of public water supply systems. Not all cases involve contamination of a drinking water source.

The city of Eau Claire Municipal Wellfield that provides all of the drinking water for the city is contaminated with VOCs and has been designated as a Superfund site. National Presto Industries (NPI) has been determined to be the source of this contamination. The contamination is a result of waste disposal activities at NPI. The water from these contaminated wells is treated with an air stripper and mixed with uncontaminated well water prior to distribution for consumer use. As a result of this treatment, the drinking water provided to the users is safe to drink.

Atrazine Prohibition Areas

Atrazine is a herbicide that selectively controls broadleaf weeds and is often used on corn. It is one of the most widely used herbicides in the United States. The

For a detailed map of atrazine prohibition areas, contact the Department of Agriculture, Trade and Consumer Protection or check out their website at: <http://datcp.state.wi.us/static/atraine/>

combination of widespread use and relative persistence in the environment help account for its frequent detection in surface and ground waters. The EPA has set the drinking water health limit for atrazine at 3 parts per billion (ppb). Atrazine has been identified as a potential pollutant of surface and groundwater in the Midwest. EPA currently classifies atrazine as a potential human carcinogen (or cancer-causing agent).

Some areas of the basin are highly susceptible to pesticide contamination. Thus all uses of atrazine are prohibited in parts of Pierce, St. Croix, Eau Claire and Chippewa Counties (DATCP). Table 9 shows townships containing prohibition areas as of August 2000.

Table 9. Atrazine Prohibition Areas

<u>County</u>	<u>Township</u>	<u>DATCP ID Number</u>
1. Chippewa	Auburn & Cooks Valley	PA 93-09-01
2. Chippewa	Bloomer	PA 93-09-02
3. Chippewa	Woodmohr	PA 95-09-01
4. Eau Claire	Lincoln	PA 93-18-01
5. Eau Claire	Fairchild	PA 96-18-01
6. Pierce	Hartland & Salem	PA 93-48-01
7. St. Croix	Springfield	PA 94-56-01

Special well construction advisory areas - Advisories are issued in areas known to be contaminated and areas down-gradient of known contamination and susceptible to contamination in the future. Advisories describe the geology of the area affected, the type of contaminant, and provide special well construction and/or sampling requirements. Copies of advisories are available at DNR WCR Eau Claire Office.

Table 10. Special Well Construction Advisory Areas

<u>County</u>	<u>Township</u>	<u>Contaminant</u>
1. Chippewa	Hallie	VOC's
2. Dunn	Red Cedar	Pesticides
3. Eau Claire	Washington	VOC's
4. Pierce	Trenton	VOC's

High capacity wells - Privately owned wells designed to pump 70 gallons per minute or more are designated as "high capacity wells". Such wells are generally constructed for farm irrigation or industrial use and must be approved by the DNR prior to construction. The total number of high capacity wells in the Lower Chippewa Basin is 726, the majority of which are used for farm irrigation purposes. (See

Table 11.) Current state regulations only prohibit high capacity wells from impacting nearby municipal water wells. However, the public and the Department are becoming more concerned about the potential impacts that high capacity wells may have on groundwater and surface water quantity and quality. As a result, it is likely that legislation will be introduced at the state level to expand authority to regulate groundwater withdraw and prevent negative impacts.

Table 11. Number of High Capacity Wells in Counties or Portions of Counties in the Basin

COUNTY	# OF HIGH CAPACITY WELLS
Barron	170
Buffalo	16
Chippewa	113
Clark	9
Dunn	202
Eau Claire	113
Pepin	25
Pierce	36
Rusk	3
St Croix	25
Taylor	2
Washburn	11
Total # High Capacity Wells in the Basin	726

*DNR Intranet DW/GW Website

Private water supplies

The Wisconsin Private Well Water Quality Survey was part of a Center for Disease Control (CDC) funded study conducted in 1994. The purpose of the study was to assess the impact of the extensive flooding of 1993 to the water quality of affected surface and groundwater drinking water systems in the Midwest states including Wisconsin. In Wisconsin, private wells were selected with a uniform statewide distribution and sampled for coliform bacteria, nitrate and the corn herbicide Atrazine. Within the Lower Chippewa Basin, 8.8% (6 of 68 wells) contained nitrate above the drinking water standard of 10 milligrams per liter (mg/l) and 0% (0 of 87 wells) contained Atrazine above the standard of 3.0 ug/l.

Public water supplies

A public water system is any system that provides piped water for human consumption to at least 15 service connections or serves an average of at least 25 people daily at least 60 days out of the year. Table 12 summarizes the public water supplies in the Lower Chippewa Basin. In the Lower Chippewa Basin, there are approximately 784 public water supply systems, including 44 municipalities, 39 Other than Municipal, 63 Non-transient Non-communities, and 638 Transient Non-communities. See Map 4 - Public Wells and Wellhead Protection Areas.

Table 12. Public Water Supplies in the Basin

Public Water Supply Type	Number of Water Systems
Municipal ¹	44
Other Than Municipal ²	39

Nontransient Noncommunity ³	63
Transient Noncommunity ⁴	638

Source: WDNR WCR- Laurie Boehlke

¹Municipal includes city, town or village system

²Other Than Municipal includes mobile home parks and residential subdivisions

³Nontransient Noncommunity includes schools, daycare centers and factories

⁴Transient Noncommunity includes bars, restaurants, motels, churches and parks

The DNR inspects all water supply systems serving the public to ensure compliance with all regulations. State Safe Drinking Water regulations require that all public water systems must test their water regularly for such contaminants as fecal coliform bacteria, nitrates, lead, copper, volatile organic chemicals, pesticides, industrial chemicals and radium to insure they are in compliance with safe drinking water standards. When a public water system exceeds a drinking water standard or fails to test for a contaminant, they must issue a public notice informing their customers of that fact and what they intend to do to correct the problem. The State Drinking Water Revolving Loan Fund assists communities with construction of improvements to eliminate drinking water contamination. The City of Chippewa Falls was recently awarded a loan from this fund to help pay for a nitrate removal treatment system.

Wellhead protection areas

A Wellhead Protection Plan (WHPP) is designed to protect a limited geographical area around a well or wellfield that provides water to a public water supply. The WHPP identifies the recharge area of the aquifer supplying water to the well; sources of contamination in the recharge area; and management approaches such as zoning controls to protect the water supply. Since May 1992, the DNR has required all municipalities planning to construct a new well to have prior approval of a wellhead protection plan for that well. The wellhead protection area is defined as a 1/4-mile radius around a well. DNR promotes a voluntary program for existing wells constructed prior to May 1992.

In the Lower Chippewa Basin there are eight municipalities with WHPP's. Those municipalities are Almena, Bay City, Boyd, Cadott and Chippewa Falls, Hallie, Prescott, and Thorp (Map 4 - Public Wells and Wellhead Protection Areas). Thirteen additional municipalities have submitted plans to the DNR for approval. Chippewa County also has a groundwater protection plan. The plan creates zones of restricted and/or prohibited uses in order to protect recharge areas which provide water to municipal and sanitary district water supplies. Local units of government may request that a groundwater protection overlay district be created for its municipal water supply in order to create various zones of prohibited, conditional, and permitted uses as detailed in the Chippewa county plan. These zones are based on the time it takes for groundwater to travel from the recharge zone to the municipal well in use. A similar plan is also being developed for Eau Claire County (pers. comm. M. Willkom, WDNR and K. Beaster, UW-EC).

Table 13 below shows the municipalities with Wellhead protection plans either completed or submitted to the DNR.

Table 13. Communities with Wellhead Protection Plans Planned or Approved

Municipality	# of Wells	Popu- lation	County	Region	Approved Plan	Date Plan Approved	Ordinance
Almena	2	526	Barron	NOR	YES	11/30/1994	NO
Augusta	6, 9	1,510	Eau Claire	WCR			
Baldwin	2, 3	2,032	St. Croix	WCR			
Bay City	1	577	Pierce	WCR	YES	07/18/1995	DRAFT
Boyd	4-5	683	Chippewa	WCR	YES	06/22/1994	YES
Cadott	3,5-6	1,328	Chippewa	WCR	YES	12/19/1995	YES
Chetek	1-2	1,953	Barron	NOR	NO		
Chippewa Falls	1-8	12,970	Chippewa	WCR	YES	02/19/1996	YES
Eau Claire	4, 6, 8-11, 15-17, 19	56,956	Eau Claire	WCR	NO		
Ellsworth	2-3	2,743	Pierce	WCR	NO		
Fairchild	1	504	Eau Claire	WCR	NO		
Fall Creek	1-2	1,034	Eau Claire	WCR	NO		
Hallie San. Dist.	2	409	Chippewa	WCR	YES	1997	YES
Maiden Rock	1	146	Pierce	WCR			
Pepin	1-2	873	Pepin	WCR			
Prescott	2-4	3,243	Pierce	WCR	YES	05/18/1999	
Thorp	6	1,657	Clark	WCR	YES	2000	YES
Wheeler	1	348	Dunn	WCR	NO		

Source: WDNR Drinking and Groundwater Section.

Impacts of Rural Industrial Development

Concerns exist regarding the effects of rural industrial development on groundwater quality. Many towns pursue development of industrial parks not served by sanitary sewer. Septic systems are not designed to properly treat industrial wastewater. Industrial processes may produce compounds in wastewater, which can contaminate groundwater if not properly treated. Protecting groundwater quality in these rural areas, which depend solely on shallow groundwater for their drinking water, should be a high priority for local citizens and their governments. Encouraging the development of rural industrial parks may prove to be very costly in the future if adequate wastewater facilities are not developed to serve these parks.

A very dramatic example of what can go wrong when an industry discharges wastewater to a private septic system occurred in rural Hudson Township in St. Croix County. The industry used volatile organic chemicals or VOCs in it's manufacturing process. Due to careless handling practices, VOCs spilled on the factory floor were washed into floor drains connected to the septic system. The VOC laden wastewater flowed through the septic system out the drainfield and eventually into the groundwater. Before this practice was put to a halt, it had occurred long enough to contaminate the groundwater under a major portion of Hudson Township. As a result, hundreds of private wells were contaminated with VOCs. Department staff make an effort to contact county zoning officials, advising them to closely review sanitary permit applications for new rural industries.

County groundwater maps and studies

Many counties have undertaken their own groundwater studies and developed county maps that identify well testing results, prohibition areas, aquifers and other groundwater information. Chippewa County has tracked the locations of well drilling permits that have been issued since 1987 (Map 5 - Chippewa County Well Permits). Eau Claire county has developed a sophisticated groundwater model that provides detailed information on the location and movement of groundwater within the county. The model can be used to develop Well Head Protection areas, assist in locating new wells, and help identify contaminant sources.

Disappearing Stream Discharge

Disappearing stream discharge is a term coined to describe permitted discharges of effluent to dry waterways. Except during storm runoff, the effluent seeps into the ground before reaching a continuously flowing stream. A strategy to effectively protect both surface and groundwater in these cases was initially developed in West Central Region and later adopted in a DNR staff guidance document in 1998. In the Lower Chippewa River basin there are three disappearing stream discharges, Foremost Farms at Wilson in the Eau Galle River watershed (LC03), Wilson wastewater treatment plant in the Wilson Creek watershed (LC04), and the Baldwin wastewater treatment plant in the Rush River watershed (LC22). A compliance schedule has been inserted in the discharge permits for these facilities that requires the permittee to identify and sample potentially affected private wells, inspect waterways for sinkholes, do additional effluent sampling and correct any threats to water supplies that develop along the stream corridor attributable to their effluent.

New dischargers to disappearing streams and any attempts to significantly upgrade these three plants will be required to meet the total nitrogen standard and other groundwater discharge standards. They must also meet surface water standards for the surface water classification at the discharge point and beyond. An alternative would be to pipe the effluent to continuously flowing surface water and meet discharge limits for that surface water. However, the prevalence of Exceptional Resource Waters in these areas make this option more difficult. The Department should assist these and other, nearby St. Croix River basin communities in forming a regional sewer service organization to allow consideration of a wider range of discharge alternatives than those available to small communities.

Well Abandonment

Unused and improperly abandoned wells are a significant and serious threat to groundwater quality. If not properly sealed, abandoned wells can directly channel contaminated surface water into groundwater. This water bypasses the purifying action that normally takes place in the upper layers of the soil. Open wells can pose a safety hazard to small children and animals, and are sometimes used illegally for disposal of waste substances.

Wells must be properly abandoned when removed from service. Although current law allows anyone to conduct well abandonment, WDNR recommends that licensed well drillers and pump installers be retained to fill wells. Many counties in the basin have cost-sharing programs for well abandonment either through CFSA or county funds. The Eau Claire County Land Conservation Department offers 50% cost-share. Some counties offer up to 75% cost-share. Contact your County Land Conservation Department for more information. The Department also has a cost-sharing program for well abandonment in the Lower Chippewa River Natural Area, which is partly in the Lower Chippewa Basin and partly in the Buffalo River Basin. To date, 12 wells have been abandoned in this area. This particular program runs through June 30, 2001.

Directory of Groundwater Databases and Web Sites

The **Groundwater Coordinating Council** has compiled a directory of databases related to groundwater quality, quantity, and potential contaminant threats. See <http://www.dnr.state.wi.us/org/water/dwg/gcc/Index.htm>

GRN Data Base On the Web: The Groundwater Retrieval Network contains data from public and private drinking water supply wells, special groundwater studies, and landfill wells. Programs not included in the network are remediation or spill sites, wastewater treatment facilities, and landspreading sites. See [http://dnrwlfdnr.state.wi.us:8890/dnr/pws0\\$.startup](http://dnrwlfdnr.state.wi.us:8890/dnr/pws0$.startup)

EPA Office of Groundwater & Drinking Water: Drinking water & health basics, public drinking water supply programs, local drinking water information. <http://www.epa.gov/OGWDW/>

Community wells in the Lower Chippewa River Basin: Information on the community wells located in the Lower Chippewa River Basin is available at <http://www.epa.gov/surf3/hucs/07050005/index.html>

Drinking Water Issues: Frequently asked questions, public & private wells, well drillers & pump installers, publications: <http://www.dnr.state.wi.us/org/water/dwg/>

USGS Map of Arsenic in Groundwater: Although this is not a concern in the Lower Chippewa Basin, information can be found at: <http://co.water.usgs.gov/trace/arsenic/>

Groundwater Atlas of the US: http://capp.water.usgs.gov/gwa/ch_j/index.html

The **Groundwater Foundation** is a non-profit organization dedicated to informing the public about the very real risks to groundwater and the benefits received from groundwater. Their programs and publications make learning about groundwater fun and understandable for kids and adults alike. See <http://www.groundwater.org/>.

Resource Issues, Threats and Opportunities

Naturally occurring contaminants. Some contaminants occur naturally in groundwater such as iron, manganese, arsenic and radium.

Susceptible soils and geology. Geological features such as sandy soils over a shallow groundwater table and particularly shallow limestone bedrock with cracks and crevices both may allow unimpeded flow of contaminants into the groundwater. The Basin Team should work with municipal planners to help identify areas where groundwater contamination may result from land use decisions.

Well abandonment. Many unused wells have not been properly abandoned, and act as potential conduits of contaminants to groundwater.

Leaking underground storage tanks. Old buried petroleum, waste oil, and chemical tanks may potentially leaking into groundwater. The public should be made more aware of this potential contamination problem, and existing programs to identify and remove leaking underground storage tanks.

Old landfills potentially leak leachate (a mixture of water and contaminants leached from garbage and solid waste) into groundwater. There is a list of known contamination sites such as landfills and petroleum spills where an investigation is ongoing.

Improper disposal of waste oil, paints, solvents, and left over pesticides and herbicides.

Over application of commercial fertilizers and pesticides, both residential and agricultural raising the risk of high nitrates and pesticides leaching into groundwater. Promoting nutrient and pest management should be a high priority.

Wetlands

Wisconsin Wetlands

Due to its extensive glacial geology, prior to settlement, nearly a third of Wisconsin's land area was wetland. Since settlement, nearly half of the original wetlands were drained for farmland or filled for real-estate development. Of the original 10 million acres of wetland, only about 5.3 million acres remain.

Wisconsin Wetland Inventory Program

As part of the state's effort to protect wetlands, the legislature established the Wisconsin Wetland Inventory in 1978. The Department of Natural Resources was directed to inventory (map) Wisconsin's wetlands to obtain an accurate assessment of wetlands in the state. The initial inventory was completed in 1984.

Wetlands of 2 acres or larger are outlined and classified on Inventory maps (5+ acres on older maps). Smaller wetlands are identified by point symbols (↓). The inventory classifies wetlands according to vegetative type, hydrology, human influence, and other wetland characteristics. Legends on each map explain the classification system. The most used products of the inventory are 24" x 24" paper maps. Department Regional offices have maps on file.

More information about the Wisconsin Wetland Inventory can be obtained through publications available at Regional offices.

Table 14. Wetland Classification in the Lower Chippewa River Basin

Wetland Classification in the Lower Chippewa River Basin		
Common Classes	Total Acres	% of Total Wetlands
Aquatic Bed	1,864	0.59
Forested	82,823	26.35
Scrub/Shrub	54,261	17.26
Emergent/Wet Meadow	52,326	16.64
Wet (unclassified)	63,905	20.33
Mixed classes	59,197	18.83
Total Wetlands	314,375	

The Lower Chippewa River Basin contains several types of wetland communities (See Map 6 - Wetland Classes and Table 14.). Prairie pothole wetlands are found predominantly in the western portion of the basin and are significant waterfowl production areas. Most are groundwater recharge areas and have excellent plant and wildlife species diversity. Some are large enough to be considered lakes, while others are small shallow marshes that dry up seasonally. The numerous prairie pothole wetlands contribute to the character of the western basin landscape.

The terminal moraine geology of the northern Lower Chippewa River Basin contributes to a second unique wetland community type. These terminal moraine wetlands are typically surrounded by hilly woodland. Like the prairie potholes, these also have great variability in their size. Although not as significant a waterfowl production area, they do provide tremendous diversity of habitat for wildlife. Some are lake-like, others are shallow marshes and/or sedge meadows. Most are enclosed basins with no stream outflow, and are groundwater recharge areas.

Floodplain hardwood forests make up the largest wetland complexes within the Lower Chippewa River Basin. Many of the Basin stream and river corridors include forested wetland complexes of varying widths and lengths. Most are seasonally flooded, and contain numerous ponds, open water areas, channels and backwater/sloughs. These diverse wetland complexes support a rich diversity of wildlife, fish and plant species. Many are associated with groundwater discharges and springs. They temporarily store floodwaters to help reduce flooding, absorb sediments and nutrients in their plant communities and provide extensive recreational areas.

Wetland Restoration

Through the Wetland Reserve Program the Natural Resources Conservation Service works to restore wetlands around the state. The programs offers three options to protect, restore, and enhance wetlands and associated uplands; permanent easements, 30-year easements, or 10-year restoration cost-share agreements. Landowners retain ownership and access to the land. NRCS provides cost-share money in order to restore wetlands. To date 2,165 acres have been restored by the NRCS in the Lower Chippewa River Basin.

Want to know more about the NRCS Wetland Reserve Program?

<http://www.wl.fb-net.org/Brochure/index.htm>

Summary of Wetland Resource Issues, Threats and Opportunities

Urban Development. In recent years, subdivision and rural home construction has been increasing. Many developments are associated with wetlands or small ponds. Often stormwater runoff discharges directly to wetlands, and land is graded and filled up to the wetland edge. The altered hydrology and surrounding habitat reduce the quality of these wetlands.

Pond Construction. Rural residents frequently desire a pond on their property and often want to convert a wetland to a fish or wildlife pond. There is a great need for education about the important functional values of natural wetlands and about the adverse impacts of dredging wetlands to create ponds.

Highway development accounts for the greatest amount of loss of wetlands in the basin. The needs for new and improved highways cannot always avoid wetland loss. Department authority to mitigate the loss of these wetlands helps somewhat to reduce the overall net loss of wetland acreage. The quality of wetlands restored through the mitigation process can be good.

Regulatory program staffing needs. Wetlands suffer because of inadequate staff to administer regulatory programs designed to protect them. Laws that regulate wetland activities are controversial and jurisdiction to regulate and therefore protect wetlands is not strong.

Education. A great deal of education for private landowners and developers with respect to wetland functions and values is necessary.

Restoration opportunities. Eroding croplands continue to impact wetlands in the basin. However, many incentive programs to protect wetlands, especially on agricultural land, are now well established. Programs such as the Wetland Reserve Program (WPR), Conservation Reserve Program (CRP), and Conservation Reserve Enhancement Program (CREP), Conservation Reserve Buffers are all Federal programs administered by the US Department of Agriculture. The US Fish & Wildlife Service also has significant programs for outright purchase of wetland areas as Waterfowl Production Areas, as well as a program to fund, design, and build drained wetland restorations. The Department (DNR) Wildlife Managers work with these federal agencies in an advisory capacity and have duck stamp and pheasant stamp funded programs to restore drained wetlands and establish quality habitat around the wetlands.

Runoff from Nonpoint Sources

Nonpoint Source Pollutants

Urban and rural nonpoint sources are Wisconsin's greatest cause of water quality problems, degrading or threatening about 40 percent of the streams, about 90 percent of the inland lakes, much of the Great Lakes harbors and coastal waters, and substantial groundwater and wetland areas. The effects of polluted runoff can be seen in habitat destruction, fish kills, reduction in drinking water quality, siltation of harbors and streams, and a decline in recreational use of lakes.

Want to know more about runoff pollution?

<http://www.epa.gov/OWOW/NPS/facts/point1.htm>

<http://www.epa.gov/OWOW/NPS/facts/point6.htm>

Watersheds within the Lower Chippewa Basin have been assessed to determine the need and value of conducting projects to protect or restore water quality. Criteria are used to rank streams, lakes and groundwater separately within each watershed. High, medium and low rankings are derived from numeric calculations based on inventory data available for individual streams and lakes, and groundwater assessment. The ranking identifies priority watersheds where sources of polluted runoff exist, the pollution threatens or degrades water quality, and best management practices can be used to control or prevent pollution. See Appendix 7 - Watershed Ranking for Surface and Groundwater.

Summary of Priority Watershed Projects in the Lower Chippewa River Basin

Of the 23 watersheds within the Lower Chippewa Basin, six have been or are Priority Watershed Projects. An additional 13 received at least one "high" rank for groundwater, lake or stream resources.

Table 15. Priority Watersheds in the Lower Chippewa River Basin

Priority Watershed	Year Selected	Ending Year
Hay River (LC05)	1979	1989
Lower Eau Claire River (LC14)	1983	1993
Yellow River (LC09)	1989	2000
Duncan Creek (LC18)	1990	2005
Lowes Creek (Small Scale) (LC24)	1990	2001
South Fork Hay River (LC06)	1993	2001

Hay River (LC05): In 1979, the Hay River Watershed was chosen as one of the first five priority watershed projects to be implemented by the Wisconsin Nonpoint Source Water Pollution Abatement Program. The major problem related to polluted runoff in the watershed was the loss of in-stream habitat due to intensive livestock grazing. The project partially succeeded in meeting water resource objectives. About half of the barnyard runoff systems deemed necessary to improve water quality were installed. Of the streambank protection practices needed, about one third were installed. Vance Creek experienced dramatic improvement in its fishery as a result of streambank fencing. Pre- and post-project water quality monitoring was insufficient to document significant improvements elsewhere in the watershed.

Lower Eau Claire River (LC14): The Lower Eau Claire River Priority Watershed Project was selected in 1983 and completed in 1993. The project largely succeeded in meeting water resource objectives. Project goals in animal waste control were met in 9 of 12 targeted subwatersheds, 72% of the cropland erosion control goal was achieved, and the streambank erosion control goal was exceeded with 142% of the goal achieved. The project also greatly increased awareness of nonpoint pollution problems, and participation rates for landowners for installing best management practices was very high (WDNR, 1995 *Lower Eau Claire PWS Final Report*).

Yellow River (LC09): The Yellow River Priority Watershed Project was selected in 1989, and is scheduled for completion in 2000. Streams within the watershed are nearly all degraded to where they marginally support their water quality use classifications of cold water and warm water sport fisheries. Major concerns include high levels of nutrient (phosphorus) loading, bacterial contamination and habitat loss due to cropland erosion and stream bank pasturing. Sixteen of the watershed lakes are identified as priority for nonpoint source control efforts. The watershed has experienced wetland degradation and loss, and groundwater is impacted by agricultural uses, causing elevated nitrate concentrations and detection of the pesticides aldicarb and atrazine (WDNR, 1993 *Yellow River PWS Plan*).

Identified goals to achieve improved water quality include reducing phosphorus loading to surface waters by 75 percent, reducing sediment delivery to surface waters from eroding fields by 10 to 35 percent, restricting livestock from perennial streams and lakes, restoring degraded wetlands and protecting groundwater quality.

Duncan Creek (LC18): The Duncan Creek Priority Watershed Project was selected in 1990, and is scheduled for completion in 2005. The watershed drains 193 square miles of gently rolling agricultural and wooded lands, as well as some urban areas. Several perennial streams in the watershed support cold water communities with trout fisheries. Threats to water quality in these and other streams include streambank erosion, sedimentation, and organic and nutrient loadings from animal waste, flooding and elevated stream temperatures.

Identified reduction goals for nonpoint source pollutants include reducing sediment reaching streams from agricultural sources by 50%, reducing sediment from streambank erosion by 55%, reducing organic pollutants from barnyards by 90%, and reducing organic pollutants from winterspread manure by 50% (WDNR, 1995 *Duncan Cr. PWS Plan*).

Lowes Creek (Small Scale) (LC24): The lower portion of Lowes Creek is a Small-Scale Priority Watershed that was selected in 1990, and is scheduled for completion in 2001. Much of the watershed is in agricultural use with the exception of the urbanized area around Eau Claire and the forested hillsides. Lowes Creek is a cold water Class II trout stream, which is threatened by the potential impacts of urbanization. Existing problems include excessive sedimentation and elevated water temperatures coming from upstream of the project boundary. The goal of this project is to protect Lowes Creek from further degradation by ensuring no net increase in pollutant loading from existing and future urban development. Further goals include:

- maintaining current stream temperature regimes, by preventing increased thermal discharges to the stream;
- moderate sediment and other pollutant control from existing urban and rural areas;
- high sediment and other pollutant control from future development;
- maintaining or reducing peak flows of stormwater (WDNR, 1993 *Lowes Creek PWS plan*).

South Fork Hay River (LC06)

The South Fork of the Hay River Priority Watershed Project was selected in 1993, and will end in 2001, unless legislative reauthorization extends the life of the project. The watershed drains gently rolling agricultural and wooded lands and contains eight Class I and 25 Class II trout streams. Fish surveys documented both brook and brown trout in the streams, however brook trout dominate the cold water fishery. Water resource problems include streambank erosion, sedimentation of riffle and pool areas, organic and nutrient loading from animal waste and elevated stream temperatures. Project goals include improving habitat conditions sufficiently in streams to improve the size structure of the trout population to increase carryover of adult fish, and reducing phosphorus loading by 50% to Tainter Lake and Lake Menomin from animal waste. The watershed contains about 57,500 acres of cropland, of which about 30% is enrolled in Nutrient and Pest Management (NPM) planning. The watershed goal is for 70% participation in NPM planning. Components of the final evaluation will include the number of participating landowners, dollars expended, and pollutant load reduction estimates. (WDNR, 1997 DNR CF/8 Jan. 7, 2000 *SFH PWS Draft Plan*).

The Red Cedar River Basin Study

The Red Cedar Basin is 1,893 square miles, and consists of eight watersheds. It encompasses roughly one-third of the Lower Chippewa River Basin, including most of Barron and Dunn Counties. The Red Cedar Basin has been studied extensively in order to better understand the point and nonpoint sources of

heavy nutrient loads that enter the river. Nutrient levels appear to have been highest from 1965 to 1980. In the early 1980's the levels became much lower, but have since begun to increase. Increased poultry production, row crop farming, and development pressures have all led to increased nutrient runoff, creating substantial declines in water quality, extensive algae blooms and decreasing dissolved oxygen levels. (Red Cedar River Steering Committee 1999).

Issues, Threats and Opportunities

Partnering opportunities for watershed and resource management: Counties in Wisconsin are in the process of developing countywide land and water resource plans, as a requirement for funding for county staff and activities. As of September, 2000, 7 of the fifteen counties that are fully or partially within the Lower Chippewa River Basin have completed their plans. The remaining counties are also compiling plans. There will be opportunities to foster partnerships in meeting the goals and objectives of these plans, as well as basin-wide goals.

Grants and other funding sources: Funding available through the Nonpoint Source program has changed substantially in recent years. Full-scale priority watershed projects are currently not being initiated. However, other funding opportunities, such as the Targeted Runoff Management (TRM) grant program are available to counties and other local units of government. Finding the funds to carry on watershed protection and improvement activities will depend on counties and other local units of government taking the initiative to seek funding as opportunities arise.

Wastewater and Point Source Inventory

Wisconsin Pollutant Discharge Elimination System (WPDES) Permits

Wastewater from municipalities and industries are treated prior to discharge to waters (surface and ground) of the basin. The amount of treatment is based on limits set in specific permits created for each facility. The limits fall into two groups: Categorical Limits and Water Quality Based Limits. Categorical limits are based on the technology of the wastewater treatment facility and/or the type of waste or product produced by the industry or municipality. Water Quality Based Limits concern the receiving water and involve such considerations as stream classifications, flow, hardness, pH, and the resource. Facilities must comply to whichever limit (water quality or categorical) is more stringent. When wastewater is discharged to groundwater, limits are based on background amounts of the particular parameter, health standards, or water quality standards. (per. comm. Oldenburg/Boettcher 10/25)

Municipal (public) discharges

Approximately 53 municipal facilities operate within the Basin. The largest facility in the area is the City of Eau Claire, which discharges approximately seven million gallons of treated effluent to the Chippewa River each day. Other large municipal discharges include Chippewa Falls, Menomonie, and Rice Lake. See Map 7 - Wastewater Point Sources.

Industrial (private) dischargers

Within the Lower Chippewa Basin, 37 industrial facilities have specific permits for wastewater discharges. Types of industrial dischargers include cheese and dairy production, rendering plants, swimming pools, and vegetable production. See Map 7 - Wastewater Point Sources.

General WPDES permit discharges

Currently the WDNR is tracking 119 facilities in the Lower Chippewa Basin which have general permits. These permits cover operations that discharge non-contact cooling waters, or swimming pool and spa water, potable water treatment and conditioning, discharge of treated groundwater, and landspreading of liquid industrial waste, sludge or food processing by-products.

Urban stormwater discharges

Wisconsin now requires cities with populations of more than 100,000 to obtain a storm water management permit. This requirement has also been extended to cities with populations larger than 50,000 that are located within a nonpoint source priority watershed project. The city of Eau Claire, along with surrounding designated communities, falls into this category due to the Lowes Creek priority watershed project.

Construction site discharges

Approximately 25 construction site erosion control and stormwater permits are issued annually within the Lower Chippewa River Basin for construction projects that disturb more than five acres of soil. Examples of construction sites that require a stormwater permit from the Department include subdivisions exceeding 5 acres in size, large parking lots and athletic fields. The Department of Commerce handles stormwater permits for large sites where public buildings are a part of the project.

Between approximately November 1996 and November 2000, the DNR conferred coverage for 97 construction site erosion control permits in the Lower Chippewa River Basin, covering about 1,953 acres of land disturbance. This permit data is not complete or basin specific, but includes eight counties within the Basin (Table 16.).

Table 16. Summary of Construction Site Erosion Control Permits in the Lower Chippewa Basin, 11/1996 to 11/2000.

County ¹	Number of Permits	Number of Acres
Barron	5	67
Chippewa	17	234
Clark	1	6
Dunn	13	360
Eau Claire	29	637
Pepin	0	0
Pierce	14	435
St. Croix	18	214
Total	97	1953

¹Counties not included: Washburn, Sawyer, Rusk, Taylor, Buffalo.

Construction permits are concentrated in the cities of Eau Claire, Chippewa Falls and Menomonie, and in St. Croix and Pierce Counties, where intense growth pressure comes from the Minneapolis-St. Paul metropolitan area.

The 1,886 acres, for which permit coverage was conferred between November 1996 and November 2000, are approximately the area of the City of Chippewa Falls. Although no guarantee exists, it is hoped that requiring the permit encourages construction companies to think about erosion control, develop plans to prevent erosion and implement these procedures. As enforcement activities increase in the region, we can expect to see a many-ton reduction in sediment that would otherwise have been delivered to lakes and streams in the absence of construction site erosion control plans.

WPDES Regulated land spreading of septage, irrigation of wastewater and spreading of biosolids

In the Lower Chippewa Basin approximately 104,993 acres have been approved for landspreading of septage, biosolids or irrigated wastewater. Not all of these sites are currently used for spreading. Of the 104,993 acres approved, 5,687 acres are no longer in use and 330 acres have reached their cumulative loading limit.

WPDES Animal Waste Permit Discharges

Wisconsin's animal waste program requires large livestock operations of over one thousand animal units to obtain a permit, so that water quality problems caused by manure can be reduced (1000 animal units is equivalent to 700 milk cows). Within the Lower Chippewa Basin, 22 large livestock operations have an animal waste permit. 16 of these permitted facilities are located within the Red Cedar Basin, which encompasses roughly one-third of the Chippewa Basin, including most of Barron and Dunn Counties (Map 7 - Wastewater Point Sources). The total number of large livestock operations in the basin is not known with certainty. Many operations over 1000 animal units likely exist that do not have permits, therefore it becomes difficult to estimate the amount of waste discharging from large animal waste operations to waters of the basin.

Planned Sewer Service Areas

The communities of Menomonie (1994), Chippewa Falls and Eau Claire (1990) currently have sewer service area plans. Communities over 10,000 in population are required to have plans however, any municipal area is eligible to develop a plan. The DNR provides a limited amount of funding each year to help communities across the State develop sewer service area plans. Plans should be reviewed and updated every five years depending on the significance of local changes in growth and development. The Eau Claire/Chippewa Falls Sewer Service Area Plan, which covers the cities of Eau Claire and Chippewa Falls and the Town of Hallie, is due for an update.

Issues, Threats and Opportunities

Sewer Service Area Planning: Sewer service area plans can be a major force in preserving areas of environmental significance in and around urbanizing communities. The plans promote public participation and provide a method for local units of government to work with the public and the State to accommodate the growth in their communities without sacrificing environmental values.

Construction Site Erosion Control: Eroding land during construction is a major source of sediment loss in urban and developing areas. The Department of Natural Resources oversees erosion control plans and implementation on construction sites that disturb more than five acres. The Department of Commerce oversees erosion control on smaller one and two-family home sites, but many other construction sites lack adequate protection from erosion during land disturbance. In many cases, lack of staff at the state and local level means that there is inadequate enforcement of erosion control requirements.

Large animal operations: The changing farming economy has led to the emergence of many more large farming operations, including large animal facilities. Several proposed facilities have raised social and environmental concerns within area communities and residents.

Landspreading: Holding tank waste should be mandated to go to a treatment plant during the winter to avoid the possibility of wastes running off frozen lands and entering surface waters. New construction on holding tanks ought to be banned unless year-round proper treatment is available. Industries should be required to store over the winter, which may create alternative ways of minimizing waste volumes, such as more concentrated sludge.

Non-metallic mining: There are many sand and gravel mining operations in the basin, many of which lack necessary wastewater and stormwater permits. More needs to be done to document these operations and bring them into compliance.

Construction site erosion control permit program workload: Currently, the threshold size requirement for construction site erosion permits is 5 acres. Phase II of the EPA stormwater regulations will reduce the threshold to 1 acre by March 2003. When the Phase II regulations go into effect, there will be a very large increase in staff workloads.

Land Resources

Biological Communities

Biological communities are defined and described based on a variety of factors including geographic location, species composition, topography, moisture, temperature, soils and climate. Natural factors, especially the glaciers but also windstorms, fires, drought, and floods, shaped Wisconsin's landscape. Euro – American settlement brought many changes to the landscape, including suppression of fire, large-scale intensive agriculture, and urban and industrial development.

The WDNR publication, *Wisconsin's Biodiversity as a Management Issue* (WDNR, 1995) describes seven biological communities. These communities are an aggregation of more numerous communities described by scientists in the 1950's. Identifying these communities and their biological diversity helps the Department achieve its goal of managing for sustainable ecosystems.

A community can range in size from less than an acre to thousands of acres. The Lower Chippewa Basin contains components of all seven biological communities: northern forests, southern forests, oak savannas, oak and pine barrens, grasslands, wetlands, and aquatic systems (wetlands and aquatic systems are discussed in the water sections of this report). More detailed descriptions can be found in *Wisconsin's Biodiversity as a Management Issue – Pub –RS-915 95* and *Ecological Landscapes of Wisconsin* still under development.

Northern Forests

Northern forests contain mixed deciduous and coniferous forests found in a distinct climatic zone that occurs north of a roughly S – shaped transition belt known as the “tension zone” that runs from northwest to southeast Wisconsin. Roughly half of the Lower Chippewa River Basin lies within or north of this tension zone, including Barron, Chippewa, northern Dunn, eastern Eau Claire and Clark Counties. Early forest surveys indicate that northern forests consisted of a mosaic of young, mature, and “old growth” forests composed of pines, maples, oaks, birch, hemlock, and other hardwood and conifer species. “Old growth” is defined as a community in which the dominant trees are at or near biological maturity.

Southern Forests

Southern forests (those south of the tension zone) are distinct from the northern forest because of the predominance of oaks and general absence of conifers. They are relatively open or have a park like appearance, created by the lack of small trees and shrubs. Examples of Southern Forest biological communities are found within St. Croix, Pepin, Pierce, southern Dunn and western Eau Claire Counties.

Oak Savannas

Open grassland areas interspersed with trees characterize oak savannas. Savannas were the gradation between the great prairies and the eastern deciduous forests. The savannas were perpetuated by fire. Oak savanna is now virtually nonexistent in Wisconsin, with only a few remnant areas remaining. Within the

Lower Chippewa Basin the remaining Oak savanna remnants are located in the Lower Chippewa State Natural Area in Pepin and Buffalo Counties.

Oak and Pine Barrens

In its savanna form, the barrens are plant communities that occur on sandy soils and are dominated by grasses, forbs, low shrubs, small trees, and scattered large trees. One consistent element of all barrens is their dependence on fire. The most common tree of pine barrens is the jack pine, but red pine may also be present, and Hill's oak is usually present as a shrub or as a scattering of larger trees. Oak barrens have black oak or Hill's oak as their most prominent tree and jack pine is absent. The barren is a tenuous community pulled in opposing directions by fire, frost and succession. Depending on the degree of disturbance and time since disturbance, the barrens community can range in composition from open lands comprised of grasses, shrubs and tree sprouts to savannas to closed canopy forests. Within the Lower Chippewa River Basin most pine barrens exist in eastern Eau Claire County and along the Eau Claire River. Other examples include the Otter Creek Barren State Natural Area in northern Dunn County

Grassland

The absence of trees and large shrubs and the dominance of grass and forb species characterize grassland (prairie) communities. They include prairies, brush prairies, sand barrens, sedge meadows and others. Over 400 species of native grasses, sedges and wildflowers have been identified in Wisconsin's grassland communities.

Ecological Landscapes

An ecological landscape is a *geographic area* that has similar land uses and ecological themes throughout. Ecological landscapes provide a framework for organizing and presenting information that is useful in making ecologically sound management decisions. Management that is compatible with the ecological capability of the land contributes to the larger efforts of sustaining ecosystems and natural communities statewide.

There are fifteen Ecological Landscape areas within Wisconsin, and five of these are found in the Lower Chippewa basin: Farm and Forest Transition, Central Sand Plains, Western Coulees and Ridges, North Central Forest, and Western Prairie (Map 8 - Ecological Landscapes).

Farm and Forest Transition

A band of this Ecological Landscape (EL) runs diagonally from northwest to southeast, through the northern portion of the Lower Chippewa Basin. It generally includes much of Barron, central Chippewa and northwestern Clark Counties. This EL is characterized by a mix of forest, agriculture and swamp in the transition zone between northern forests and central hardwoods. Small kettle lakes are common on the moraines in the western lobe of this EL. Soils are diverse and range from sandy loam to loam and shallow silt loam (both poorly drained and well drained). Vegetation is mainly northern hardwood forest dominated by sugar maple and hemlock, with some yellow birch, red pine, and white pine. There are small areas of conifer swamps near the headwaters of streams. Major land uses are agriculture and forestry. Agriculture is focused on dairy farming, row crops, and pasture. Forestry is the dominant land use on the eastern portion of the EL.

Ecological management opportunities include restoration of northern hardwood forests.

Central Sand Plains

The far Northwest corner of this EL reaches into southwest Clark and northeast Eau Claire Counties in the Lower Chippewa Basin. It is characterized by sandy soils, and sandstone buttes formed by Glacial Lake Wisconsin. There are no large, naturally occurring lakes. Soils are sand, loamy sand, sandy loam, silt loam, muck, peat, and small amounts of clay. Wetlands, oak forests, and pine-oak barrens cover

much of the EL. Within the Lower Chippewa River Basin, this EL supports mesic forests with some hemlock and white pine. Primary land uses are forestry (pine plantation, and pulp production), agriculture on drained soils with the use of center pivot irrigation, and cranberry production. There is also a significant area of marginal, idle agriculture land. This EL has a high percentage of public land in Clark and Eau Claire Counties.

Ecological management opportunities include:

- Large-scale barrens restoration
- Wetland restoration
- Karner blue butterfly management
- Management for large mammals
- Grassland/shrub bird management
- Management for rare herptiles such as the Massasauga rattlesnake and the Blanding's turtle
- Preservation of sandstone buttes and cliffs that are of geological importance
- Upland conifer forests of jack, red, and white pine restoration

Western Coulees and Ridges

This EL covers much of the western portion of the Lower Chippewa Basin, including south-central Barron, most of Dunn, southwestern Chippewa, most of Eau Claire, all of Pepin and southern Pierce Counties. It is characterized by highly eroded, driftless topography, relatively extensive forested landscape, and big rivers and wide river valleys. These rivers include the Mississippi and Chippewa. Spring-fed, cold-water streams are common in some areas. Soils are silt loam (loess) and sandy loam over sandstone residuum over dolomite. Vegetation consists of bluff prairie, oak-forest, oak savanna, and some mesic forest. Relict conifer forests are a rare natural community. Talus slopes are found along the bluffs of the Mississippi. Areas of floodplain forest exist with associated wetlands. The major land use is agriculture, including dairy and beef farms, on the ridge tops and stream valleys. Many crop- and pasturelands are in set-aside programs such as Conservation Reserve Program (CRP). Wooded slopes are often managed for oak-hardwood production.

Ecological management opportunities:

- Large-scale prairie and savanna restorations
- Grassland bird management
- Goat prairie restoration and maintenance
- Preservation of cliff communities, along with cave and bat hibernacula
- Protection and maintenance of relict hemlock stands
- Management of large floodplain forests, and large southern upland forest tracts (Lower Chippewa river corridor)
- Maintenance of red and white oak as a cover type

Northern Central Forest

A portion of this EL is found in the north east area of the Lower Chippewa Basin, including the eastern edge of Barron, northeastern Chippewa and western Taylor Counties. It is characterized by end and ground moraine with extensive northern hardwoods and small creeks, kettle lakes and associated large wetlands. There are almost no large lakes. The moraines are also the headwaters of many major streams including the Chippewa River. Soils are rocky and often poorly drained acid silt loams, over underlying acidic, reddish, sandy loam till. Some areas are loam and loamy sand. Vegetation is primarily hardwood forest, made up of a mix sugar maple, basswood and red maple, and some hemlock, white pine and red pine. Tamarack, white cedar, black ash and black spruce are present in the conifer swamps. The major land use is timber for pulp production. Because this is an area with large public lands, recreation activities are important. There is marginal agriculture with some dairy farms using pastures.

Ecological management opportunities:

- Management for large mammals such as elk and bear and wolves
- Management opportunities for bobcats and pine martens
- Management of eagles, ospreys, and loons
- Restoration of large-scale hardwood stands (containing little amounts of aspen)
- Habitat management for edge-sensitive species
- Management of intact functioning forest ecosystems that have landscape integrity within a matrix of forests.
- Managing the diverse nesting area for neotropical migratory songbirds

Northwest Sands

This Ecological Landscape is a large pitted outwash plain consisting of two landforms: flat plains or terraces, and hummocky sediments. There are several hundred kettle lakes on the pitted outwash plain. The headwaters of the St. Croix-Namekagon and Brule River systems are located in this Ecological Landscape. Soils are deep loamy sands, low in organic material. Vegetation includes extensive open and overgrown barrens dominated by jack pine, northern pin oak and prairie species. Large wetlands are intermixed with the barrens. Major land uses are forestry for pulp production, some agriculture in the southern part of the Ecological Landscape, recreation, and tourism.

Ecological management opportunities:

- Large-scale restoration of oak-pine barrens and wetlands
- Special management of grassland/shrub birds and wolves
- Opportunity for white and red pine restoration
- Maintenance and restoration of pothole lakes, wild rice lakes, streams and springs, and conifer swamps.

Western Prairie

A portion of this EL is found in the far northwest corner of the Lower Chippewa Basin, in southern St. Croix and northern Pierce counties. It is characterized by its rolling driftless topography and primarily open landscape, with rich prairie soils, pothole lakes, ponds, and wet depressions. Soils are a mosaic of silty, shallow, alluvial sands and peat, and stony red clay subsoil. Prairie grasses are found in the rolling areas and wet prairies in the broad depressions. Open oak savannas and barrens are found on the steeper hilly topography, with inclusions of sugar maple-basswood forest in small steep sites. Pothole wetlands are mainly found in St. Croix County. Dairy farming and grain agriculture are the primary land uses, with strong urbanization pressure from the Twin Cities.

Ecological management opportunities:

- Restoration of wetland/grassland communities with a special focus on grassland birds
- Restoration and maintenance of the pothole/wetland complex and other wetland communities for waterfowl

Public Lands

Today much of the basin is set aside in national forest land, state owned lands, and county forest lands. See Map 9 - Land Ownership.

State Parks, Trails and Recreation Areas

In the Lower Chippewa Basin, State Parks preserve some of the best scenery, plants, wildlife and places of historical, archaeological or

Want to know more about Wisconsin State Parks?

<http://www.wiparks.net>

or obtain a Wisconsin State Parks Visitor Information Guide at any DNR Service Center or State Park.

geological interest. The purpose of the state parks is to provide areas for public recreation and for public education in conservation and nature study. The Lower Chippewa Basin includes two State Parks, three State Trails and one State Recreation Area, totaling nearly 11,200 acres. See Appendix 8 - Public Lands in the Lower Chippewa Basin, for a list of these areas.

State Natural Areas

Wisconsin's landscape has experienced dramatic changes in the 150 years since intensive settlement began. Little remains of the natural plant and animal communities which occupied our lands and waters in the settlement era and which set the stage for what Wisconsin has become. Their scattered remnants, which escaped the saw, plow and other development, are called *natural areas*. These exceptional sites are often the last refuges for rare plants and animals.

We owe much to Wisconsin's early conservationists, who in 1951 recognized the loss of natural communities and their importance, and fostered the first state program in the United States to preserve them.

Want to know more about State Natural Areas?
<http://www.dnr.state.wi.us/org/land/er/snas/info.htm>

State Natural Areas (SNAs) are formally designated sites devoted to scientific research, the teaching of conservation biology, and especially to the preservation of their natural values and genetic diversity for future generations. They are not intended for intensive recreational uses like picnicking or camping. Wisconsin's Natural Areas Program (NAP) holds to its original mission: to locate and preserve a system of State Natural Areas harboring all types of biotic communities, rare species, and other significant natural features native to Wisconsin. The Lower Chippewa River Basin includes ten State Natural Areas, encompassing over 2,200 acres. A large landscape scale Natural Area was recently approved to protect Endangered Resources in the Basin (Lower Chippewa River State Natural Area in Chapter 1). See Appendix 8 - Public Lands in the Lower Chippewa Basin, for a complete listing of State Natural Areas in the basin.

State Wildlife Areas

State wildlife areas in the basin are acquired to preserve an important American heritage of wild lands and wild things for hunters, trappers, hikers, wildlife watchers and all people interested in the outdoors. They help protect and manage important wildlife habitat and help prevent draining, filling and destruction of wetlands. They are also purchased to maintain access to important waterways, game lands and lakes. There are 13 Public Wildlife Recreational Lands in the Basin, encompassing over 19,300 acres. See Appendix 8 - Public Lands in the Lower Chippewa Basin.

State Fishery Areas

State fishery areas have been purchased to protect important waterways in Wisconsin from improper landuse due to agricultural abuse or urban runoff. They are used to help preserve and manage headwaters and springs that often form the biological base for stream fisheries, and they protect and improve spawning grounds for lake fisheries. State fishery areas provide angler access and trout fishing recreational opportunities. Fishery areas often consist of fee-title ownership as well as easements. In addition, fee title land provides other opportunities such as hiking, hunting, trapping and wildlife watching as Wildlife Areas due. There are 11 State Fishery Areas in the Lower Chippewa Basin. See Appendix 8 - Public Lands in the Lower Chippewa Basin.

Ice Age National Scientific Reserve

The Ice Age Trail was designated a National Scenic Trail by Congress in 1980 and a State Scenic Trail in 1987. The trail traces features left by the last glacier that swept over Wisconsin more than 10,000 years ago. When completed, the Trail will cover 1,200 miles through some of the finest glacial scenery in the

state. Today, a little over one-half of the trail is complete. The Ice Age Trail winds through northern Chippewa County. Other portions of the trail are located in northern Barron and Rusk Counties.

- **Chippewa Ice Age Moraine** – New Auburn: Situated along the Ice Age Trail, visitors enjoy unspoiled beauty with kettle lakes and many glacial features. The interpretive center sits atop a hill that was once a glacial lake bottom.

County Forest Land

The Wisconsin County Forests are governed by the County Forest Law, which requires that they be managed for forestry purposes – including multiple uses such as recreation, wildlife habitat, and watershed protection. These lands are open to the public and provide numerous recreational opportunities. Within the Lower Chippewa administrative area are the Chippewa County Forest, Clark County Forest, and the Eau Claire County Forest. The Chippewa County Forest consists of 32,210 acres the Clark County Forest has 132,798 acres, and the Eau Claire County Forest consists of 52,040 acres. (pers. comm. Heil)

Management of these County Forests is the responsibility of a County Forest Administrator who is accountable to county residents through the County Boards. Forest Administrators are required to prepare comprehensive ten-year plans, which must be approved by their County Boards as well as the Wisconsin Department of Natural Resources. An annual work plan is derived from the goals agreed upon in the long-range document.

To learn more about these three County Forests, write or contact the County Forest Administrator below:

Chippewa County
711 North Bridge Street
Chippewa Falls, WI 54729

Clark County
517 Court Street
Neillsville, WI 54456

Eau Claire County
227 First Street West
Altoona, WI 54720

Federally-managed land - U.S. Fish & Wildlife Service Land

The U.S. Fish and Wildlife Service is the principal Federal agency responsible for conserving, protecting and enhancing fish, wildlife and plants and their habitats for the continuing benefit of the American people.

Want to know more about National Wildlife Refuges and fisheries programs?

<http://refuges.fws.gov>

<http://fisheries.fws.gov>

The Service manages the 93 million-acre National Wildlife Refuge System, which includes, more than 520 National Wildlife Refuges and thousands of small wetlands and other special management areas. Under the Fisheries program it also operates 66 National Fish Hatcheries, 64 fishery resource offices and 78 ecological services field stations.

Upper Mississippi River National Wildlife & Fish Refuge

The Upper Mississippi River National Wildlife & Fish Refuge is located along 284 miles of the Mississippi River valley extending from the confluence of the

Chippewa River near Wabasha, MN to near Rock Island, IL. The FWS and US COE lands that make up the refuge lie in four states: MN, WI, IA, IL. The Headquarters are located at Winona, MN. The Refuge is largely confined to the floodplain. The Refuge provides migratory habitat for a large percentage of the

Want to know more about the
[Upper Mississippi River National Wildlife & Fish Refuge](#)

migratory birds in the Mississippi Flyway. Tundra swans and canvasback ducks use the Refuge as a resting and feeding area in the spring and fall.

The Refuge receives between \$5-8 million annually for habitat projects under the Corps of Engineers - funded Environmental Management Program. These projects include a mix of wetland management, grassland/forest management, and fisheries attributes. Types of projects include active water level management, island building, closing structures, bank stabilization, oxygenation of backwaters, and dredging areas for over wintering fish. In addition, the refuge works with the Corps to find ways to make their channel maintenance program much more environmentally friendly. This presently involves environmentally sound means of handling dredged material disposal, but will ultimately involve notching, building, or eliminating parts of the navigation infrastructure to redirect flows and eliminate sedimentation problems in critical habitat. Refuge programs include restoration of native grass prairie, forestry management work, waterfowl banding, surveys for waterfowl, neotropical migrants, colonial nesting birds, eagles, and marsh and water birds, invertebrate sampling, and vegetative monitoring.

Waterfowl Production Areas

Waterfowl Production Areas (WPAs) are the prairie jewels of the National Wildlife Refuge System. WPAs preserve wetlands and grasslands critical to waterfowl and other wildlife. These public lands, managed by the U.S. Fish and Wildlife Service, were included in the National Wildlife Refuge System in 1966 through the National Wildlife Refuge Administration Act. Congress amended the Duck Stamp Act, passed in 1934, in 1958 to authorize acquisition of wetlands as WPAs. Thus began one of the most aggressive acquisition campaigns in history, a race against drainage tiles and ditches.

Nearly 95 percent of WPAs are located in the prairie pothole areas of North and South Dakota, Minnesota, and Montana. North Dakota alone has 39 percent of the Nation's WPAs. Other key states are Michigan, Nebraska, Wisconsin, and Iowa. Idaho and Maine each have one WPA. Within the Lower Chippewa Basin, there are five WPAs, totaling over 950 acres (pers. com., Candy Chambers and David McConnell, USFWS, New Richmond). See Appendix 8 - Public Lands in the Lower Chippewa Basin.

Private Lands

Within the Lower Chippewa River Basin, many acres of privately owned lands are managed for wildlife or habitat benefits, under state, federal and county incentives programs or through non-profit organizations. Some of these management programs were described in the previous chapter. In this chapter, private lands within the Lower Chippewa River Basin are identified.

Conservation Reserve Program

The Conservation Reserve Program (CRP) provides financial incentives to landowners to retire sensitive croplands and other lands from crop production. It encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover, such as tame or native grasses, wildlife plantings, trees, filterstrips, wetland restorations or riparian buffers. Converting highly erodible lands reduces soil erosion, which in turn reduces sedimentation in streams and rivers and creates wildlife habitat. Farmers receive an annual rental payment for the term of the multi-year contract. Cost sharing is provided to establish the vegetative cover practices. (USDA Conservation Program)

Want to know more about the Conservation Buffer Initiative?
<http://www.nhq.nrcs.usda.gov/CCS/Buffers.html#Anchor-WhatBuffer>
Farm Service Agency's website:
<http://www.fsa.usda.gov/pas/default.asp>

Financial incentives available through the continuous CRP sign-up are especially attractive:

- A signing incentive payment of \$100 to \$150 per acre for riparian buffers, filter strips, grassed waterways, shelterbelts, field windbreaks, and living snow fences.
- Up to 50 percent cost sharing for practice installation.
- A practice incentive payment equal to 40 percent of eligible practice installation costs.
- A 20 percent rental rate incentive for riparian buffers, filter strips, grassed waterways, and field windbreaks.
- A 10 percent rental rate incentive for wellhead protection areas.
- Higher annual maintenance payments per acre for certain activities.
- Updated rental rates nationwide for installing riparian buffers on marginal grazing land. (USDA Conservation Program)

Table 17. Acres of CRP Lands by County from 1986-August 2000

County	Acres
BARRON	4,039
BUFFALO	11,454
CHIPPEWA	5,110
CLARK	1,379
DUNN	22,158
EAU CLAIRE	14,485
JACKSON	8,893
PEPIN	3,902
PIERCE	20,567
RUSK	477
ST CROIX	30,508
SAWYER	119
TAYLOR	158
WASHBURN	398

(FSA website 2000)

Managed Forest Law

The purpose of Wisconsin Forest Tax Laws is to encourage proper forest management on private lands by providing property tax incentives to landowners. This is accomplished

with a binding contract between the state Department of Natural Resources and private landowners. Lands entered under the forest tax laws have written management plans that landowners must follow. Contract length varies with each law and can run for periods of 25 or 50 years depending on which law and the year lands are entered. The Managed Forest Law is the only program currently available for enrollment.

Want to know more about forest tax laws?

<http://www.dnr.state.wi.us/org/land/forestry/ftax/faq1.htm>

Table 18. Managed Forest Law and the Forest Crop Law Lands

County	Acres in Managed Forest Law	Acres in Forest Crop Law
CHIPPEWA	8,749	3,597
DUNN	22,209	7,342
EAU CLAIRE	18,125	2,068
PEPIN	10,626	848
PIERCE	15,921	2,067
ST CROIX	10,475	1,893

*(as of January 1, 2000; pers.comm. Schott 11/00)

Chapter 4 - Partners and Priorities

Wisconsin's Natural Resources Vision

The reorganization of the DNR in 1996 optimized efficiency and effectiveness, and improved integration of DNR programs to better serve citizens and environmental protection. Residents of the state have input into the agency through basin partner teams, to set local priorities for natural resource management.

Want to know more?

<http://www.dnr.state.wi.us/aboutdnr/missionstatement.html>

<http://www.dnr.state.wi.us/aboutdnr/plans/>

The Department Strategic Plan is built around four major goals, extracted from the Department Mission Statement. These provide the foundation for developing the Lower Chippewa River Basin Partner Team, and setting Basin goals and objectives:

- I. *Making People our Strength*
People, organizations and officials work together to provide Wisconsin with healthy, sustainable ecosystems. In partnership with all publics we find innovative ways to set priorities, accomplish tasks and evaluate successes to keep Wisconsin in the forefront of environmental quality and science-based management.
- II. *Sustaining Ecosystems*
The state's ecosystems are balanced and diverse. They are protected, managed and used through sound decisions that reflect long-term considerations for a healthy environment and a sustainable economy.
- III. *Protecting Public Health and Safety*
Our lands, surface waters, groundwater and air are safe for humans and other living things that depend upon them. People are protected by natural resources laws in their livelihoods and recreation.
- IV. *Providing Outdoor Recreation*
Our citizens and visitors enjoy outdoor recreation and have access to a full range of nature-based outdoor recreational opportunities.

The Fisheries, Wildlife and Habitat Management Plan for Wisconsin

The Fisheries, Wildlife and Habitat Management Plan for Wisconsin (FWH) was completed in June, 2000. This plan is intended to guide Department staff and partners in the work that we do to protect, improve and manage habitat, game animals, sport fish and non-game wildlife. It is a six-year plan, for 2001 through 2007. Beginning on July 1, 2001, work plans, priorities and budget allocations will be based on this plan.

Many of the goals and objectives of the FWH Plan have been incorporated into the Basin Goals and Objectives.

The Lower Chippewa Basin Partner Team

In 1997 the Department of Natural Resources restructured its field offices to accomplish more integrated management of natural resources. Part of this restructuring involved working to create Partnership Teams consisting of individuals and

organizations with an interest or stake in natural resources. Department staff from Lands and Waters suggested a core membership that was used to self-select members of the Lower Chippewa Partnership team. Members of the Partnership Team represent approximately 9 non-profit organizations, 7 businesses, 10 local or state governments, and 4 University or UW-Extension offices. Individuals hail from all reaches of eight of the counties in the Lower Chippewa River Basin.

Want to know more about Partner Teams?

<http://clean-water.uwex.edu/lowerchip/>

<http://clean-water.uwex.edu/basins/index.html>

The purpose of creating Partnership Teams is to improve natural resources within river basins such as the Lower Chippewa River Basin. These Partner Teams are a means of creating a network among individuals and organizations with common interests and goals. The benefits to a participant might include sharing successes, building new partnerships and networks, identifying previously unknown resources to help accomplish goals, and joining forces on a project of common interest to collectively achieve more than any one partner could alone. Organizations and individuals have unique resources such as knowledge, expertise, time, meeting facilities or financial resources to add to the partnerships. Each organization or individual will bring something to the Partner Team effort.

Initially the Lower Chippewa Partner Team focused their resources on issues and projects related to the proposed Lower Chippewa Natural Area Feasibility Study. They recommended public participation actions and suggested boundary changes to the study area. As the Feasibility Study was nearing completion the Partner Team began discussing its future. The original Partner Team made the decision to expand its membership in order to represent the entire Lower Chippewa River Basin both in terms of the geographic boundary and natural resource issues of the basin.

The formation of the Lower Chippewa Basin Partner Team has increased the opportunity for discussion and sharing of ideas concerning the natural resources within the Lower Chippewa River Basin. Members of the Partner Team have the opportunity to identify critical resource issues in the basin (Appendix 9 - Prioritized Natural Resource Issues), recommend management projects and/or solutions, and suggest common implementation plans to address those issues. A goal of the Basin Partnership Initiative is to increase the coordination among partners as they work together towards addressing common resource management priorities in the Lower Chippewa River Basin.

The Red Cedar River Basin Project

The Red Cedar River Basin Project began in 1995 as a pilot project in the State of Wisconsin. This project was initiated jointly by the DNR and UW-Extension. A goal of this project is to involve local partners in water quality planning and programming on a watershed scale with its main focus on reducing phosphorus input to the Red Cedar River. This project has since evolved into the formation of a Steering Committee that involves stakeholders including participation and leadership from local industry, farmers, academics, conservation groups, environmentalists, wastewater treatment plants, and local governments. The Steering Committee has developed the following vision:

"To improve and preserve water quality in the Red Cedar River Basin by identifying and understanding the problems and promoting education and cost-effective, innovative water management solutions."

Figure 9 - Red Cedar River Basin



The purpose of the steering committee is to provide representation of stakeholders in the Red Cedar River Basin in 1) identifying water quality issues, problems, and basin needs; 2) seeking management alternatives, formulating solutions and coordinating implementation; and 3) prioritizing water quality projects and goals. Initially a series of public meetings were held to discuss and gather input on the Red Cedar River Basin. As a result a list of water quality issues and concerns such as agricultural runoff, storm water management, land use, and shoreland management were identified. This list has been used as a foundation for activities and projects of the Red Cedar River Basin Steering Committee.

Land and Water Resource Issues, Goals and Objectives

Land and water resource staff and the Partner Team worked together to identify important resource issues within the Lower Chippewa River Basin. These nine issues reflect the highest resource concerns of Department staff, the Basin Partner Team, and the public who attended open houses.

For each of the issues, staff and the Partner Team developed goals and objectives that were identified as most valuable for the resource needs of the Lower Chippewa River Basin. These goals and objectives are specific to the Basin but also reflect the Department's Strategic Goals, Strategic Implementation Plan and the Fisheries, Wildlife and Habitat Management Plan for Wisconsin - 2001 through 2007.

Priorities and Work Planning

The nine issues are listed in order of relative importance based on input from DNR staff, the Partner Team and the public. The DNR has the skills, knowledge and resources to address many of these issues, goals and objectives; for some, other agencies or entities are more appropriate. Considerations for work effort expended by the WDNR on these issues will include the ability of the department to play a role in addressing the issue, the resource benefit that can be accomplished related to the issue and the timeliness of the issue for achieving results.

Watershed Data Bases as Decision-making Tools

Beginning in December 1999, Basin Water Team staff began the process of developing a database for housing the extensive inventory information that has been collected on the surface water resources of the basin. Previously, much of this information has been scattered and difficult to locate.

The watershed database will allow far better utilization of resource information. It can be queried to locate specific information and reports can be generated directly from the database. Links can be created between watershed database information and other databases or geographic information systems.

It is anticipated that when the database is completely functioning, it will be a key tool for work planning. It will assist in identifying specific inventory and management activities, and locations where these activities are needed to achieve the goals and objective for identified priority issues.

In addition, groundwater and other databases, as identified in Chapter 3 of this report, will be utilized for work planning.

1996 Water Quality Management Plan

The watershed discussions and management recommendations found in the 1996 Lower Chippewa River Water Quality Management Plan will continue to be an important for workplanning and decision-making, until they are updated in coming years.

Comment Codes within the Basin Goals and Objectives

Where the Basin Goal and Objectives are substantially similar to goals and objectives identified in other plans, comment codes identify these plans as follows:

- **I, II, III and IV:** The Department's Strategic goals, listed as I, II, III and IV above.
- **SIP:** The Department's Strategic Implementation Plan.
- **FWH:** The Fisheries, Wildlife and Habitat Management Plan for Wisconsin for 2001 through 2007.

Issues, Goals and Objectives

- A. **Habitat: Loss, impairment, and fragmentation of native habitats have jeopardized the ecosystem function of sustaining, balanced communities of aquatic (groundwater and surface water) and terrestrial, animal and plant populations.**

Goal 1: Manage for a biologically diverse, balanced and healthy aquatic ecosystem, which meets fishable and swimmable standards and the WDNR strategic objectives for biodiversity. Support databases for aquatic systems.

Objective 1

Implement and promote shoreland habitat protection and restoration activities.

Performance Measures

- a. At the end of 2003, two new shoreland restoration demonstration projects are successfully completed.
- b. A Basin pilot shoreland restoration training workshop is completed in 2002.
- c. Interpretive signs are installed at three restoration sites by June 2002.
- d. Conduct at least one public tour annually at the Lake Wissota State Park Shoreland Habitat Restoration Demonstration site.

Goal 2: Identify and protect critical spawning, reproductive, and nursery habitat in Wisconsin lakes, streams and rivers. [FWH]

Objective 1

Conduct studies on the free-flowing portions of the Chippewa and Red Cedar Rivers to better understand the populations, movement and critical habitat of Channel and Flathead Catfish. Recent baseline monitoring documented a low density, but quality sized flathead catfish fishery, and a strong population of channel catfish in the lower Red Cedar and lower Chippewa Rivers.

This study will provide a baseline of information on catfish populations, prior to implementation of new flow regimes in 2003, as a result of the Lower Chippewa River FERC Settlement Agreement. Significant changes in river flow will improve habitat conditions for all river species, and will likely significantly improve recreational and angling opportunities.

Performance Measures

- | | |
|---|--------------------|
| a. Collect aging data and mortality estimates | June 2003 |
| b. Collect a population estimate on the lower Red Cedar River. | June 2003 |
| c. Obtain movement and harvest information by angler tag returns. | June 2003-On Going |
| d. Final Report and Entry into FH database. | March 2004 |

Objective 2

Conduct a Habitat Use Assessment for the shovelnose sturgeon and blue sucker on the Lower Chippewa and lower Red Cedar River. Regional fisheries staff will collect seasonal movement and habitat selectivity information using radio telemetry and pit tags on shovelnose sturgeon and blue sucker. This assessment will replicate an assessment conducted in the 1960's and will answer many critical questions about two species for which there is very little comprehensive information available in Wisconsin or the nation.

Performance Measures

- a. Fieldwork will be completed in 2002.
- b. Data analysis and report writing will be completed by March of 2003.
- c. Publication of results and distribution to fisheries biologists throughout the state as well as the upper Midwest.

Objective 3

Survey selected cold water resources each year to evaluate the status of trout populations, the effectiveness of past stocking, and to identify sites with native fish where non-native fish like brown trout or hatchery fish should not be introduced. Survey sites are selected to assess the need for fish passage, the effects of flow regime changes, the effects of past stocking, and to maintain reference sites.

Performance Measures

- a. Trout populations in 12 to 15 cold water streams are surveyed annually.

Goal 3: Improve critical habitat sites in the basin with stream bank protection or in-stream habitat restoration to enhance sport fisheries. [FWH]

Objective 1

Restore degraded stream banks on selected streams to stabilize banks, reduce long term erosion and create improved habitat for trout populations. Maintain or repair previously stabilized banks to extend their habitat functions.

Performance Measures

- a. Restore and/or repair 3200 feet on Cady Creek (LC03), 2100 feet on Elk Creek (LC13) and 2000 feet on McCann Creek (LC21) during FY'02.
- b. Restore and/or repair 3800 feet on Elk Creek (LC13), 3200 feet on Trimbelle Creek (LC23) and 800 feet on the Eau Galle River (LC03) during FY'03.
- c. Post-restoration trout population surveys will indicate success of this project.

Other desired actions**Habitat protection and improvement**

- a. Promote incentive programs for habitat protection or improvement in cooperation with other agencies.
- b. DNR staffs work with other agencies, non-governmental organizations and local governments in preparing comprehensive plans based on the *Ecosystem Decision Management Model*. (SIP)
- c. Identify and prioritize threatened or sensitive biological communities in the Basin where feasibility studies are needed.
- d. Address ecosystem management through Managed Forest Law (MFL) and Forest Stewardship Plan writing.
- e. Focus on habitat restoration to improve natural reproduction of game and fish species, reducing the need for stocking programs.
- f. Characterize the fish, mussel, and aquatic insect community in 5 sites per GMU in critical river and stream habitats on an annual basis. [FWH]
- g. Reduce flathead catfish harvest. Manage it as a trophy sportfish.

Land Acquisition

- h. Secure fee title or permanent easements in order to allow habitat restoration to occur in a timely manner.
- i. Identify opportunities to protect, enhance or restore threatened ecosystems through the Acquisition 2050 Plan. [FWH]
- j. Acquire lands identified as high priority within existing Streambank Protection, Wildlife, Fishery and Natural Areas.
- k. Achieve land acquisition objectives for the Western Prairie Habitat Restoration Area and the Lower Chippewa State Natural Area. [FWH]

Shorelands

- l. Assist local units of government in planning and protection of sensitive shoreland areas.
- m. Promote use of Forestry Best Management Practices in riparian areas. [FWH]

Wetlands

- n. Identify and prioritize wetlands in need of protection, restoration and enhancement. [FWH]
- o. Protect wetland complexes with exceptionally high value through acquisition, incentives and other innovative strategies by federal, state and local government and not-for-profit conservation organizations. [FWH]
- p. Improve coordination with army corps of engineers during wetland permitting processes.
- q. Fisheries, Invert, Aquatic Macrophyte and water quality monitoring of major floodplain lakes and sloughs of the Chippewa River.

B. Sediment and Nutrient Sources: Excessive sedimentation to surface waters and the release of nutrients (nitrogen and phosphorus) from point and nonpoint sources into the Lower Chippewa River Basin are degrading surface and groundwater for beneficial uses and threaten natural, diverse aquatic communities.

Goal 1: Achieve water quality improvement for 303(d) Impaired Waters through the TMDL process. [FWH]

Objective 1

Conduct a nutrient study of the Yellow River watershed to develop a TMDL recommendation for Lake Wissota. This study will include nutrient sampling, flow monitoring, load determination, water quality modeling of Moon Bay, with "BATH TUB" to determine nutrient sensitivity, and "SWAT" modeling analysis of the watershed, to determine nutrient loading distribution.

Performance Measures

- a. Stream monitoring data for the first two years of this project will be summarized in a report prepared in 2003 by the COE.
- b. Monitoring data and modeling results will be summarized in reports prepared by USGS and COE during 2003.
- c. All of the monitoring and modeling data will be incorporated into development of the TMDL, which will be completed in 2004.

Objective 2

- a. Conduct a nutrient study in the Rice Lake and Red Cedar Lake Watersheds in Barron and Sawyer counties to develop TMDL recommendations for the Red Cedar Basin. This study will include monitoring of in-flowing nutrient loads and in-lake water quality conditions, determination of nutrient loads and hydrologic budgets, completion on "BATHTUB" modeling of the lakes and "SWAT" modeling of the watershed, to develop management goals and implementation strategies.
- b. Conduct a study of the level of phosphorus present in groundwater within the Red Cedar Basin. TMDL development for Tainter Lake needs to account for the influence of all sources of phosphorus. The setting of a water quality goal and the ability to achieve it depends on the level of phosphorus control possible. There is some current evidence to indicate that both deep and shallow aquifers may have unexpectedly high levels of P (near 1 ppm). This study will examine a number of wells in the Basin for phosphorus concentration. If high levels are common throughout the basin then additional work may be needed in the second year of the biennium to further quantify that source.

Performance Measures

Objective 2a:

- a. Monitoring is completed by September 2002.
- b. Monitoring data and modeling results will be summarized in reports prepared by USGS and COE during 2003.
- c. Management goals and implementation strategies will be completed during FY'03, and the monitoring and modeling reports for these lakes will be incorporated into the Tainter Lake TMDL.
- d. Complete the Red Cedar Basin TMDL by the end of 2006.

Objective 2b:

- a. A written report detailing the extent of high phosphorus-bearing groundwater in the basin is completed at the end of FY'02.

Objective 3

Complete a TMDL plan for Half Moon Lake in Eau Claire County.

Performance Measure

- a. A draft plan for the Half Moon Lake TMDL is completed by December 2001.
- b. A final plan for the Half Moon Lake TMDL is completed by July 2002.

Objective 4

Seek funding for monitoring other 303(d) Impaired Waters.

Performance Measures

- a. Conduct two years of lake and stream monitoring for Mead Lake, a 303(d) Impaired Water, following receipt of funding.
- b. Update 303(d) impaired waters list for the basin by April 2002.

Goal 2: Qualified local units of government seek available grants or other sources of financial support for pollution control activities.

Objective 1

Identify local units of government or communities that are qualified to apply for Target Runoff Management (TRM) and Urban Nonpoint Source grants, and opportunities for resource benefit through these grant programs. Assist identified local units of government in competing for grant funding.

Performance Measures

- a. Qualified local units of government complete grant applications and compete effectively for grant funding.

Other actions

- a. Promote landowner participation in nutrient management planning.
- b. Promote the use of best management practices for small farms to reduce surface water impairment.
- c. Work cooperatively with county governmental units to effectively administer and enforce nutrient and sediment controls.
- d. Work cooperatively with local units of government, developers and individuals to effectively administer and enforce construction site erosion control permits and stormwater control ordinances.
- e. Promote effective control of erosion at construction sites, through training sessions for contractors, developers and local units of government.
- f. Control the discharge of sediment and nutrients from point sources through regulatory programs.
- g. Assist counties in the update of land & water resource plans.

C. Development: Rural landscape and associated natural communities are being transformed into rural residential areas, compromising the biological integrity of the landscape and creating forest fire protection issues. Growth and development of business and industry on urban perimeters encroaches on green space, destroys wildlife habitat, impacts wildlife distribution, and alters infiltration and drainage patterns, with resulting flood hazards and water quality impairments.

Goal 1: Identify and implement strategies to buffer the effects of rural residential development adjacent to sensitive habitat [FWH].

Objectives

Provide relevant resource monitoring or inventory data to local units of government within the basin that are developing comprehensive land use plans under the Smart Growth program.

Performance Measures

- a. West Central Regional Planning Commission receives resource data for communities that they are contracted with for Smart Growth planning assistance, including the cities of Rice Lake and Thorp, and the towns of Cleveland, Bloomer and Goetz in Chippewa County.

Other Actions

- a. Assist communities with stormwater planning.
- b. Assist communities with sewer service area planning.
- c. Promote forest fire awareness in wildland/urban interface areas.

D. Drinking Water and Groundwater: Agricultural and industrial practices, as well as urban/rural development threaten a high quality and plentiful groundwater resource in the Lower Chippewa Basin

Goal 1: Protect drinking water and groundwater quality from agricultural, industrial and urban/rural development activities. [II, III]

Objective 1

The Safe Drinking Water Act requires states to implement a Source Water Assessment Program to protect public health by preventing contamination of public water supplies. Each public water system requires an assessment, which includes 1) delineation of assessment area boundaries; 2) inventory of significant potential sources of contamination within the boundaries and 3) a susceptibility determination for each well.

Performance Measures

- a. Complete the ongoing survey of potential contaminant sources for public water supplies, by completing the survey of transient non-community systems by December 2001.
- b. Complete the ongoing digitizing of potential contaminant sources for public water supplies, by completing digitizing of other-than-municipal community systems and non-transient non-community systems by December 2001.
- c. Complete data entry of public well information (depends upon completion of data entry template by the Bureau of Drinking Water).
- d. Complete Source Water Assessment Reports for all public water supply systems in the Basin by 2007.

Objective 2

Assist local units of government in developing public wellhead protection plans.

Performance Measure

- a. DNR staff will promote wellhead protection plans as part of their annual inspection of all municipal waterworks.
- b. At least one new wellhead protection plan is approved annually for the next five years.

Objective 3

Assist local units of government and landowners to promote proper well abandonment techniques.

Performance Measure

- a. DNR staff will contact all county zoning offices annually, that not already offering cost-sharing programs for well abandonment to promote such programs.
- b. DNR staff will track the number of wells properly abandoned in each county annually, to assess well abandonment program effectiveness.

Objective 4

Promote public awareness of well construction advisory areas and atrazine prohibition areas.

Performance Measure

- a. List all advisory areas and atrazine prohibition areas on the DNR website by 2003.

Objective 5

Counties become qualified to issue their own well and pump installation permits, to assure timely and effective groundwater protection during these activities. When qualified, the DNR can delegate this responsibility to these counties.

Performance Measure

- a. DNR staff assists at least one county annually to qualify for delegation of issuance of well and pump installation permits.
- b. DNR staffs monitor all counties with delegated permit authority to assure compliance.

Objective 6

Basin Water Team members and partners become more informed about groundwater quality issues in the basin. This includes a review of the numerous past and current water sampling programs and resulting data, to understand the extent of groundwater contamination from nitrates, pesticides or other contaminants, and any trends that can be discerned. It also includes an understanding of the range of preventive and corrective measures that are available to address groundwater quality.

Performance Measures

- a. A small Subteam group will present information and lead a discussion on groundwater issues for a Water Team Meeting by August 2001.
- b. At the direction of the Water Team, a selected Subteam will prepare a follow-up report for the Water Team by December 2001, to include specific recommendations for reducing the level of contaminants currently found in public and private wells in the basin.

Goal 2: Protect drinking water and groundwater quantity from agricultural, industrial and urban/rural development uses and activities. [II, III]

Objective 1

Identify inventory needs for high capacity wells, and complete needed inventories.

Performance Measure

- a. Inventory of high capacity wells is completed by 2003.

Objective 2

Work with communities and citizens to promote water conservation practices. Conservation practices can include reduction of water loss due to leaking pipes, changes in citizen water use for activities such as lawn watering or car washing, and development of ordinances to limit excessive water use.

Performance Measure

- a. DNR staff will assist at least one priority community annually in the development and promotion of new or improved water conservation practices.
- b. DNR staff will track annually the change in water use per capita in communities that initiate water conservation practices.

Other Actions

- a. Work with local units of government to promote stormwater planning to effectively develop, administer and enforce stormwater control ordinances, in accordance with established rules (NR151). Work with other agencies (COM), to incorporate safe infiltration of stormwater and groundwater recharge, in accordance with existing performance standards (NR 151) and technical standards as they are developed.
- b. Provide continuing education for well drillers and pump installers.
- c. Provide sewage treatment plant operator certification training and waterworks training.
- d. Promote proper disposal of wastes (oil, pesticides, paints, solvents etc.) and proper application of commercial fertilizers.
- e. Team with Remediation and Repair and Solid Waste program staff, as well as other state agencies like DATCP, Commerce and DOT, to identify contaminated wells and insure groundwater contamination remediation.
- f. Decrease the % of drinking wells not meeting Maximum Contaminant Levels.

E. Inventory and Monitoring: Efficient and effective resource management depends on knowledge of the current condition of each resource and whether the resource is stable, improving or declining. Basic inventory and monitoring data collection is incomplete and is needed for resource management decisions.

Goal 1: Sufficient inventory data is available for sound resource management decisions.

Objective 1

Implement a basin-wide "Wadable Stream Monitoring Program". See Appendix 10, Basin Monitoring and Management Schedules and Plans, for more detailed information.

Performance Measures

- a. Sample 50 to 65 sites per year, 10-15 sites per watershed on a 5-year rotational basis to obtain spatial and temporal coverage of the entire basin.
- b. Collect stream habitat and fish community data, temperature and macroinvertebrate samples using standardized protocols, to assess local, regional and statewide status and trends of stream integrity.
- c. Sample four "least-impacted" reference streams annually for long-term trend comparisons.
- d. Enter field data generated each year into the Statewide Fish and Habitat Database and into the Basin Watershed Tables database.

Objective 2

Implement "Nonwadable Baseline Monitoring" at selected sites on the Lower Chippewa, Lower Eau Claire and Upper and Lower Red Cedar Rivers. See Appendix 10, Basin Monitoring and Management Schedules and Plans, for more detailed information.

Performance Measures

- a. Conduct baseline nonwadable stream monitoring using protocols identified in the January 2001 nonwadeable baseline monitoring guidance.
- b. Enter field data generated each year into the Statewide Fish and Habitat Database and into the Basin Watershed Tables database.
- c. Complete a final report by March 2002 for sites on the Eau Claire River.

Objective 3

Implement basin-wide "Lakes Monitoring Program". See Appendix 10, Basin Monitoring Schedules and Plans, for more detailed information.

Performance Measures

- a. Sample 4 to 7 lakes per year within the basin on a 5-year rotational basis to obtain spatial and temporal coverage of the entire basin.
- b. Collect a suite of biological and physical parameters, using standardized protocols to assess local, regional and statewide status and trends of lake ecosystem integrity.
- c. Enter field data generated each year into the Basin Watershed Tables database.

Objective 4

Conduct a comprehensive fisheries and habitat survey of the Yellow River and its tributaries from the dam at Chequamegon Waters Flowage downstream to Lake Wissota, including the Paint Creek and Drywood Creek subwatersheds. The study will include a baseline monitoring component for wadable streams, a baseline monitoring project for nonwadable streams, and a comprehensive, warmwater streams survey. See Appendix 10, Basin Monitoring Schedules and Plans for more detailed information.

Performance Measures

- a. Completion of all survey elements during FY'02 and FY'03.
- b. Entry of field data generated into the statewide database system by the end of FY'03.
- c. Completion of watershed report by FY'03.

Objectives 5

Conduct monitoring activities at prioritized dam sites to assess dam impacts on water resources and environmental conditions, and to develop a management strategy.

Performance Measures

- See Dams issue for performance measures identified for this objective.

Other desired actions

- a. Evaluate and report the impact of harvest and regulations on sportfish large river systems by 2007.
- b. Creel Census Recommended for lower 17.5 miles of the Red Cedar River from Menomonie downstream to the mouth 2003-2004. Priority ranking is high.
- c. Creel Census Recommended for lower 61 miles of the Chippewa River from Dells Dam to Lake Pepin 2003-2004. Priority ranking is high.
- d. Integrate monitoring and inventory activities between programs for efficient use of staff and resources.

- e. Reduce and/or eliminate the backlog of unanalyzed, unreported survey data, to improve trend evaluation capability.
- f. Develop trends indexing for lakes, rivers, streams, and groundwater.
- g. Develop data sharing agreements with local units of government, other institutions, and partners involved in land use planning and help them apply the data to local decisions. [FWH]
- h. Collaborate with researchers from area Universities in collection of field data.
- i. Conduct a post-evaluation of the Colfax IEM project.
- j. Develop and improve the capacity to use the Aquatic and Terrestrial Resource Inventory (ATRI) system, and to search and download Natural Heritage Inventory information and data on the Internet to support land use and management decisions. [II, FWH]

F. Dams: There is a need to reduce the number of streams impacted by aging smaller dams, which no longer serve their original function. Many present safety hazards and cause habitat impairment, including altered temperature regimes, create barriers to fishery populations and movement, and affect water quality. Identification of the departmental role in community decision-making is necessary.

Goal 1: Improve stream habitat and public safety by removal, modification or operational changes of small dams that no longer serve their original function. Restore the ecological integrity of flowing waters through dam removal or modification.

Objectives

- a. Develop a prioritized list of dams in need of inspection, based on established inspection schedules and the potential for resource improvement.
- b. Conduct monitoring activities at prioritized dam sites to assess dam impacts on water resources and environmental conditions.
- c. Develop management recommendations and alternatives for monitored dam sites.
- d. Assist interested communities in making dam repair or removal decisions.
- e. Remove dams on state-owned property where removal is the recommended action based on monitoring.

Performance Measures

- a. A prioritized list of dams for inspection and monitoring is developed by April, 2001.
- b. Monitoring is completed at prioritized dams between April and August 2001. Dams where more intensive monitoring is needed are identified, and monitoring at these sites is completed by October 2002.
- c. A written report is completed which details the extent of potential for environmental improvement through dam removal or modification on selected streams by December 2002.
- d. Educational and public involvement activities are planned and implemented for at least one interested community by June 2002.
- e. At one or more dam sites annually, the ecological integrity of flowing waters is improved through removal, modification or operational changes.

Hydropower dams and their operations have the potential to impact river ecology and recreational use opportunities. The FERC relicensing process provides unique and timely opportunities to minimize these impacts.

Goal 1: Minimize impacts of hydropower operations (FERC) on large river ecosystems of the basin.

Objective 1:

- a. At least one DNR staff member, trained and experienced in the FERC relicensing process, participates in each FERC relicensing proceeding.
- b. Hydropower operations comply with FERC Settlement Agreements.

Performance Measures

- a. DNR fisheries and habitat recommendations are incorporated into the Red Cedar River FERC Settlement Agreement in 2003.
- b. Issue 401 certification for the Chippewa River hydropower projects within 180 days of the signing date of the Lower Chippewa River Settlement Agreement and for the Red Cedar River hydropower projects by 2003.

G. Education: Changing resource issues and needs in the Lower Chippewa basin require an integrated, dynamic educational strategy to address the public need for resource information. Successful resource management depends on a well-informed public that understands resource problems and potential solutions.

Goal 1: An integrated educational strategy fosters public understanding of resource problems and potential solutions of the Lower Chippewa Basin. [I]

Objective 1

The Lower Chippewa River State of the Basin Report is an educational tool for the public.

Performance Measures

- a. The report is available on the web and contains active links to other relevant web sites by August 2001.
- b. Hard copies of the report are available at all public libraries, LWCD, UWEX and DNR offices in the Basin.

Objective 2

An education team consisting of DNR staff and Partnership members will draft an educational strategy that addresses the educational needs of land, forestry and water programs.

Performance Measures

- a. A draft educational strategy is completed by July 2002.
- b. Incorporate components of the basin education strategy into DNR and UW-Extension Lower Chippewa River Basin web sites, in cooperation with the UW-EX Basin Educator.

Goal 2: Educational initiatives target specific resource needs in the basin.

Objective 1

Implement and promote shoreland habitat protection and restoration activities.

Performance Measures

- a. See Goal 1, Habitat Issue.

Other Actions

- a. Utilize the resources of the Bureau of Communication and Education in developing an educational strategy and materials (<http://intranet.dnr.state.wi.us/int/caer/ce/>).

- b. Promote "EEK" (<http://www.dnr.state.wi.us/org/caer/ce/eeek/>), "Into the Outdoors", and other educational programs already in place.
- c. Increase departmental interactions, workshop presentations and partnerships with local youth educators.
- d. Promote Lakes Partnership education strategies.
- e. Provide forestry education related to sustainable forestry, fire protection and fire management techniques for prairie maintenance.
- f. Provide construction site erosion control education

H. Recreation: Access to privately owned lands and public water for outdoor recreation, hunting and fishing is diminishing as land ownership and land uses change. Public land and water is also impacted by increased recreational use pressure and user conflicts.

Goal 1: The public has adequate access to land for outdoor recreation through a combination of public and privately owned lands that are managed sustainably for compatible recreational uses and environmental protection uses. [IV]

Objective1

Work with partners and DOT to coordinate the completion of the Chippewa Valley Trail System providing a continuous corridor from Brunet Island State Park at Cornell through Chippewa Falls and Eau Claire along the Chippewa and Red Cedar Rivers to Menomonie.

Performance Measures

- Completion of the Chippewa Valley Trail System by 2005.

Goal 2: Provide a variety of fishing opportunities for experienced and novice anglers by managing for a variety of sport fisheries consistent with statewide guidelines and regulations categories. Improve sport fishing by protecting, maintaining and restoring critical habitat for natural sport fish stocks and their associated aquatic communities.

Objectives and Performance Measures

See the Habitat Issue, Goals 1-3.

Other Actions

- a. Support access to sport fishing and other recreational opportunities for all citizens.
- b. Consider outdoors recreational needs in making land acquisition decisions.
- c. Promote incentive programs for public access on private lands for recreation.
- d. Assist local units of government in developing management plans to ensure compatible use opportunities for the available resources.
- e. Improve access to large rivers and lakes and streams.

I. Staff/Agency Concerns: The need and demand for resource management and environmental protection services is increasing, but available staff and funding have not kept pace.

Goal 1: Citizens, who live, work and recreate in the Lower Chippewa Basin are represented in and share responsibility for resource management decisions.

Objective

The GMU Partnership team represents a wide range of interested partners, has clear goals and shares responsibilities for managing the Basin's resources.

Performance Measures

- a. The number and diversity of partnership team members will be maintained or increased.

Goal 2: Adequate program and professional support is provided to allow staff to focus on utilizing their expertise and experience in carrying out their work responsibilities.

Needs

- Regional staff support is provided for clerical tasks, data entry, and other routine activities.
- Regional staff and support are provided for GIS mapping and database development.

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Appendix 1 - Summary of County Land and Water Conservation Plans

County	Identified water resource problems	Goals	Objectives/Actions
Barron	<ul style="list-style-type: none"> Unrestricted livestock access to streambanks. Euthrophication of surface waters from excess runoff. Poor water quality from sediments associated with agricultural runoff. Uncontrolled runoff from animal lots. Residential runoff in the Chetek Chain of lakes. Degraded wetlands from livestock trampling and siltation. Threats to existing groundwater quality from land use activities. 	<ul style="list-style-type: none"> Reduce soil loss to 'T' on all cropland. Further reduce soil loss to sustainable levels. Improve communications with farmers. Develop new cooperative agreements. Promote conservation tillage. Reduce soil erosion and land abuse on rented land. Reduce sedimentation of wetlands, streams, rivers, and lakes caused by soil erosion. 	<ul style="list-style-type: none"> Use the conservation planning process to install BMPs. The USLE soil loss exceeds the ability of soil to maintain itself over time. Barron County LCD intends to encourage farmers to reach this more conservative goal. Meet with farmers once a year in the entire county. Update older outdated forms and agreements to better reflect today's conservation agenda. Provide a chisel plow to farmers that have not done reduced tillage. Sponsor a bi-ennial conservation tillage workshop. Develop cropland rental agreements with expected conservation requirements included. Re-emphasize traditional cropland soil conservation techniques. Install riparian buffers as indicated in the plan. Continue to encourage CRP enrollments.

- Control erosion from construction sites.
- Reduce over application of nutrients to agricultural cropland.
- Reduce runoff of animal waste into wetlands, streams, rivers and lakes.
- Improve riparian habitat.
- Reduce the phosphorus content of urban runoff.
- Offer construction site erosion control workshops.
- Develop a County wide ordinance for construction site erosion control.
- Help develop farmer written nutrient management plans.
- Certify one staff position as CCA qualified.
- Apply to the DNR for TRM grants on Lake Desair (303d listed), Pokegama Creek, Ten Mile Creek, Prairie Lake, and Rice creek.
- Administer the manure management prohibitions.
- Develop a county ordinance to implement the animal waste prohibitions.
- Encourage retailing of phosphorus free fertilizer.
- Conduct workshops for urban homeowners.
- Provide cost sharing for wetland restoration and work with DNR for additional assistance.
- Arrange a system of proper well abandonment at the time of property transfer.
- Seek alternatives to road salt use.
- Conduct household clean sweeps.

- Restore previously drained wetlands.
 - Protect groundwater from abandoned wells.
 - Protect groundwater from contamination by hazardous materials.
 - Provide additional education for lakeshore owners on lake management activities.
 - Protect lakeshore areas from livestock.
 - Acquire additional copies of the Barron County groundwater study for wider distribution.
 - Develop a how-to guide.
 - Continue the Barron County lakeshore newsletter
 - Provide financial incentives for lakeshore owners to re-establish vegetation along shorelines.
 - Develop an ordinance prohibiting livestock access to lakeshores.
-

County	Identified water resource problems	Goals	Objectives/Actions
Dunn	<ul style="list-style-type: none"> • Sedimentation of surface waters • Agricultural runoff to surface waters. • Lack of instream habitat. • Phosphorus loading of surface waters. • Shallow bedrock causing groundwater susceptibility to pollutants. 	<ul style="list-style-type: none"> • Reduce runoff containing phosphorus and sediment by 15% to 20% on croplands. • Establish riparian buffers and filter strips on 50% of the stream miles. • Protect groundwater quality. • Develop nutrient management plans on 3,000 acres per year. • Reduce acres over 2 ‘T’ by 4% each year. • Reduce acres between 1 and 2 ‘T’ by 2% per year. • Eliminate “alternative” systems on highly erodable land. 	<ul style="list-style-type: none"> • Inventory 303d waters. • Inventory outstanding and exceptional resource waters. • Work with DNR on establishing a TMDL for the Red Cedar River. • Design and install 5 miles of buffers per year. • Administer manure storage system closures. • Administer abandoned well closures. • Support NRCS wetland Reserve program. • Help farmers write their own nutrient management plans. • Spot check 25% of farmland preservation plans.

County	Identified water resource problems	Goals	Objectives/Actions
Eau Claire	<ul style="list-style-type: none"> Rural • Overflowing, leaking or abandoned manure storage facilities. • Overapplication of fertilizer/manure. • Stacking manure too close to water. • Unrestricted livestock access to streams. • Cropland erosion 	<ul style="list-style-type: none"> • Reduce phosphorus loading • Reduce soil erosion rates 	<ul style="list-style-type: none"> • Develop farmer written nutrient management plans. (25/year). • Promote buffer strip initiatives. • Provide County funding for manure storage needs (\$25,000/year). • Conduct transect surveys. • Enter 5 new landowners in farmland Preservation program annually.
	<ul style="list-style-type: none"> • Urban • Waste materials dumped into storm sewers. • Overapplication of fertilizers. • Draining/filling of wetlands. • Groundwater quality. 	<ul style="list-style-type: none"> • Reduce pollutants in stormwater. • Reduce sediment from construction sites. • Work with local agencies. 	<ul style="list-style-type: none"> • Continue to implement and enforce County Code requirements. • Assist with studies, education, and wellhead protection code development.

County	Identified water resource problems	Goals	Objectives/Actions
Pepin	<ul style="list-style-type: none"> Excessive cropland soil erosion. Streambank erosion. Animal lot runoff. Nutrient enrichment of surface waters. High rates and volumes of runoff. High nitrate levels in groundwater. Degraded fish habitat. 	<ul style="list-style-type: none"> Protect all soils from excessive erosion. Reduce environmental risks to water quality through proper animal waste management. Improve fisheries. 	<ul style="list-style-type: none"> Complete the transect survey. Construct grade stabilization structures. Enroll riparian land in Conservation reserve Buffer initiative. Focus on total resource management planning. Increase use of Hay in crop rotations. Maintain PL 566 structures. Work with local sports clubs on fishery improvements. Hold a construction site erosion control meeting. Use county cost share funding for BMP installations. Work with animal waste prohibitions. Search for grants and seek more funding. Relocate feedlots that are right next to or in streams. Establish pasture management on 10 farms in 4 years. Demonstrate streambank protection on 1 farm. Provide funding and assistance to install stream crossings and fencing.

- Assist farmers with using nutrient management plans, watering devices, animal waste handling practices, roof runoff management, barnyard diversions, and buffers.
 - Increase public awareness about wetland values.
- Protect wetlands, restore and eliminate degradation.
 - Restore 80 acres per year of wetlands.
 - Restore buffers around 5 wetlands per year.
 - Develop a county wide land use plan.
 - Cooperate with USFWS and seek funding.
- Protect woodlands from grazing and erosion.
 - Provide information to woodland owners on benefits of woodlands.
 - Encourage enrollment of woodland owners in to forest management programs.
 - Promote tree and shrub planting.
 - Advocate for logging road erosion control.



County	Identified water resource problems	Goals	Objectives/Actions
Pierce	<ul style="list-style-type: none"> • Sedimentation of Nugget Lake and county area streams. • Streambank erosion. • Animal lot runoff. • Nutrient loading of surface waters. • Increased temperatures in cold water streams. • Decreased stream habitat. • Construction site erosion. • Nitrate and atrazine contamination of groundwater. 	<p>Reduce average cropland soil loss rate.</p> <p>Maintain and where possible improve surface and groundwater quality.</p>	<ul style="list-style-type: none"> • Complete the transect survey. • Continue the projects in Plum Creek and the Kinni River watersheds. • Assess interest in a project in the Trimble River watershed. • Utilize new DATCP funding. • Continue existing programs in county cost sharing, Wisconsin Farmland Preservation, and floodwater protection. • Promote use of managed intensive grazing systems in the Plum Creek watershed. • Complete well testing in the Plum Creek watershed. • Conduct a Nugget Lake sediment survey. • Encourage use of BMPs. • Assist owners in meeting animal waste prohibitions.

County	Identified water resource problems	Goals	Objectives/Actions
St. Croix	<ul style="list-style-type: none"> • Protection of groundwater quality • Nutrient and sediment pollution of water bodies • Loss and degradation of aquatic and riparian habitat 	<ul style="list-style-type: none"> • Protect and improve groundwater quality to supply clean water for drinking and recharging surface waters and wetlands. • Protect and enhance surface waters and wetlands to preserve their ecological functions and recreational and scenic values. • Protect and restore fish and wildlife habitats for native species, improved water quality, recreational opportunities, and natural beauty. • Preserve agricultural land and soils for crop and livestock production, scenic values, and wildlife habitat. 	<p>Ensure quality drinking water to residents of the County.</p> <ul style="list-style-type: none"> • Groundwater protected from surface water contamination. • LCD practices are designed to protect groundwater. • Expand and update groundwater data. • Implement BMPs through federal and state cost share programs. • Develop a LCD revolving loan fund and cost share program to support BMP installations. • Review animal waste storage facilities for groundwater protection. • Supply bentonite for well closures. • Monitor installed practices. • Inventory sinkholes and closed depressions. • Expand nutrient management planning to all cropland by 2010. • No net increase in stormwater quantities from developed areas.

- No increased temperature of trout streams from runoff.
 - Promote conservation easements and land acquisitions programs from other agencies.
 - Develop a County sponsored easement program.
 - Adopt and enforce the erosion control provision of the uniform dwelling code county wide.
 - Encourage development of a countywide stormwater management plan.
 - Complete a transact survey for soil loss.
 - Promote and coordinate land management activities of the DNR Western Prairie Habitat Restoration Area.
 - Map environmental corridors, environmentally sensitive areas, and quality habitats such as native community remnants.
 - Develop a purchase or transfer of development rights for agricultural land.
-

County	Identified water resource problems	Goals	Objectives/Actions
Taylor County	<p>Presence of 303d listed surface waters for a number of lakes in the County.</p> <p>Concern over quality of groundwaters in the County.</p>	<ul style="list-style-type: none"> • Preserve and improve groundwater quality and maintain adequate quantity to supply clean water for drinking and for recharging surface waters and wetlands. • Protect and enhance rivers and streams to preserve their ecological, recreational, and scenic values. • Protect and improve the entire natural lake environment. • Encourage stewardship of private forest lands to limit adverse impacts on soil and water resources and enhance sustainable resource use. • Promote land use practices that ensure sustainable use of soil resources. 	<ul style="list-style-type: none"> • Have drinking water from private wells meet current drinking water standards. • Municipal wellhead recharge zones are delineated and protected. • Proper abandonment of dug wells. • Develop additional information on groundwater characteristics. • Continue drinking water testing and education program. • Continue clean sweeps for hazardous waste collection. • Develop an ordinance to require septic system inspections and upgrades at time of property transfer and sale. • Maintain or restore natural riparian buffer zones. • Reduce erosion along stream banks. • Minimize sediment, nutrient, and chemical runoff to rivers and streams. • Enhance and restore instream habitat. • Inventory and prioritize critical areas.

- Provide technical and financial assistance for BMP installation.
- Enforce the shoreland zoning ordinance.
- Purchase easements and titles to land along rivers and streams.
- Complete a river classification for shoreland zoning.
- Inventory pollution sources.
- Preserve native aquatic vegetation.
- Reduce shoreline erosion.
- Study lakes to set water quality goals.
- Encourage the use of forestry best management practices.
- Limit nonpoint source pollution from forestry activities.
- Land disturbances will be held to tolerable soil loss levels.
- Develop a countywide soil erosion control ordinance.
- Initiate comprehensive land use planning.

Appendix 2 - Goals of the Smart Growth Program

- (1) Promotion of the redevelopment of lands with existing infrastructure and public services and the maintenance and rehabilitation of existing residential, commercial and industrial structures.
- (2) Encouragement of neighborhood designs that support a range of transportation choices.
- (3) Protection of natural areas, including wetlands, wildlife habitats, lakes, woodlands, open spaces and groundwater resources.
- (4) Protection of economically productive areas, including farmland and forests.
- (5) Encouragement of land uses, densities and regulations that promote efficient development patterns and relatively low municipal, state governmental and utility costs.
- (6) Preservation of cultural, historic and archaeological sites.
- (7) Encouragement of coordination and cooperation among nearby units of government.
- (8) Building of community identity by revitalizing main streets and enforcing design standards.
- (9) Providing an adequate supply of affordable housing for individuals of all income levels throughout each community.
- (10) Providing adequate infrastructure and public services and an adequate supply of developable land to meet existing and future market demand for residential, commercial and industrial uses.
- (11) Promoting the expansion or stabilization of the current economic base and the creation of a range of employment opportunities at the state, regional and local levels.
- (12) Balancing individual property rights with community interests and goals.
- (13) Planning and development of land uses that create or preserve varied and unique urban and rural communities.
- (14) Providing an integrated, efficient and economical transportation system that affords mobility, convenience and safety and that meets the needs of all citizens, including transit-dependent and disabled citizens

Appendix 3 - Outstanding and Exceptional Resource Waters of the Lower Chippewa River Basin

OUTSTANDING RESOURCE WATERS

<u>WATERBODY NAME</u>	<u>COUNTY</u>	<u>WATERSHED CODE</u>
Bass Lake (T34N R9W S16)	Rusk	LC08
Bear Lake	Barron	LC10
Benson Creek	Sawyer	LC11
Duncan Creek	Chippewa	LC18
Elk Creek	Chippewa, Dunn	LC13
Engle Creek	Barron	LC09
Fish Lake	Rusk	LC08
Hickey Creek	Barron	LC09
Long Lake	Washburn	LC10
McCann Creek	Chippewa	LC21
Red Cedar Lake	Barron	LC11
Silver Lake	Barron	LC09
Three Lakes No.1 (T36N R9W S25)	Rusk	LC11
Upper Pine Creek	Barron	LC07
Yellow River	Barron	LC09

EXCEPTIONAL RESOURCE WATERS

<u>WATERBODY NAME</u>	<u>COUNTY</u>	<u>WATERSHED CODE</u>
Beaver Creek	Eau Claire	LC14
Big Elk Creek	Chippewa, Dunn	LC13
Big River	Pierce	LC23
Brill River	Barron	LC10
Brown Creek	Barron	LC09
Cady Creek	Pierce, St. Croix	LC03
Clear Creek	Eau Claire	LC24
Como Creek	Chippewa	LC18
N. Fork Como Creek	Chippewa	LC18
Creek 15-2 (T27N R7W)	Eau Claire	LC14
Creek 16-12 (T27N R7W)	(Little Beaver) Eau Claire	LC14
Creek 17-11 (T28N R10W)	Chippewa	LC13
Creek 17-13 (T30N R7W)	Chippewa	LC21
Creek 32-3 (T30N R9W)	Chippewa	LC18
Creek 33-15 (T29N R10W)	Chippewa	LC13
Creek 35-12 (T29N R10W)	Chippewa	LC13
Creek 36-6 (T30N R10W)	Chippewa	LC18

EXCEPTIONAL RESOURCE WATERS

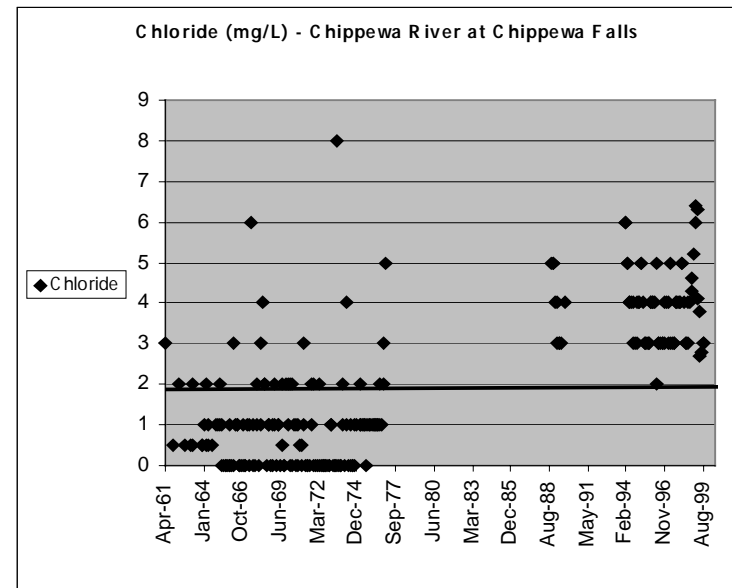
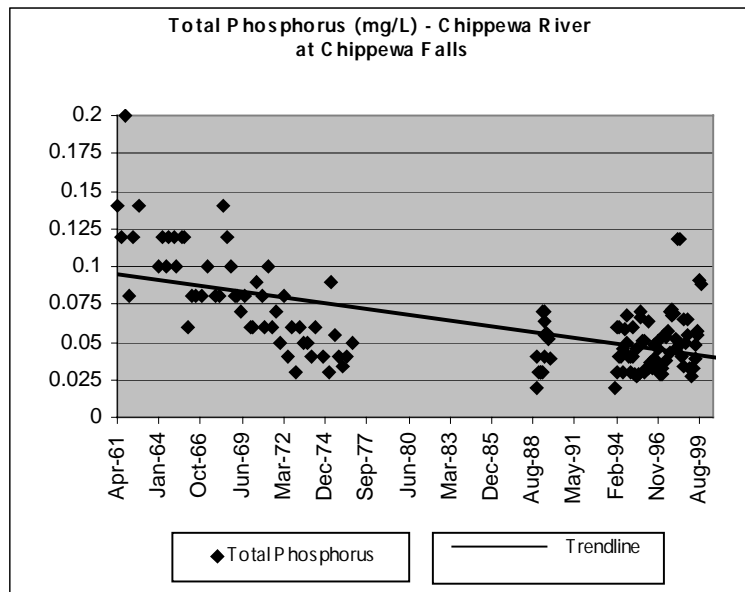
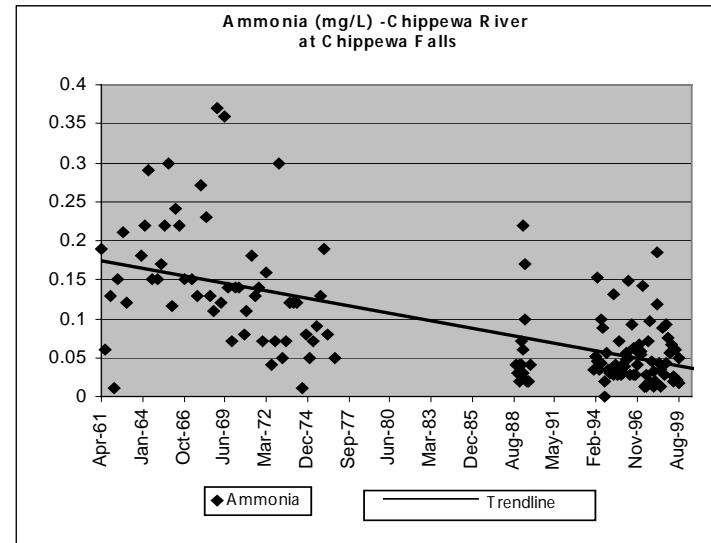
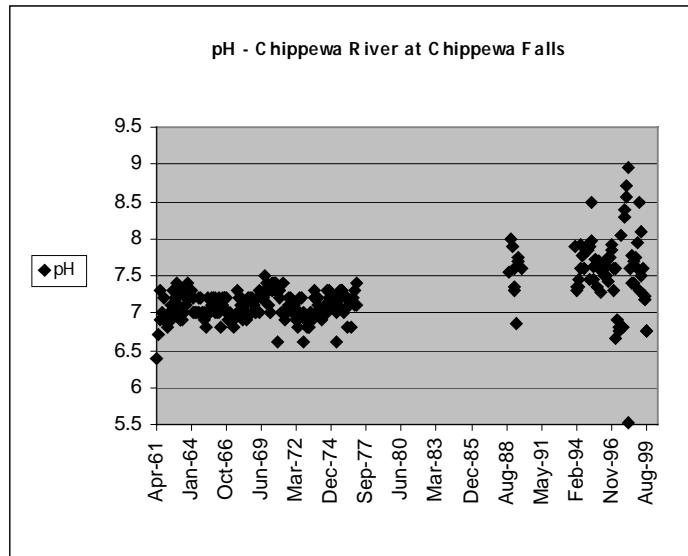
WATERBODY NAME	COUNTY	WATERSHED CODE
Creek 5-16 (T28N R10W)	Chippewa	LC13
Creek 8-3 (T31N R10W)	Chippewa	LC07
Darrow Creek	Eau Claire	LC15
Dority Creek	Barron	LC05
Eighteenmile Creek	Chippewa	LC07
Forty-One Creek	Sawyer	LC11
Hay Creek	Eau Claire	LC15
Hemlock Creek	Rusk	LC11
Jones Creek	Barron	LC05
Knuteson Creek	Sawyer	LC11
Louler Creek	Rusk	LC11
Lowes Creek	Eau Claire	LC24
Moose Ear Creek	Barron	LC08
Pigeon Creek	Rusk	LC11
Rice Creek	Barron	LC08
Rock Creek	Rusk	LC08
Rush River	Pierce	LC22
S Fork Hemlock Creek	Rusk	LC11
Sand Creek	Chippewa, Dunn	LC07
Sevenmile Creek	Eau Claire	LC14
Silver Creek	Barron	LC05
Spring Brook	Chippewa	LC07
Sucker Creek	Sawyer	LC11
Swim Creek (Swan)	Chippewa	LC17
Thirty-three Creek	Sawyer	LC11
Trimbelle River	Pierce	LC23
Trout Creek	Chippewa	LC18
Tuscobia Creek	Barron	LC10
Vance Creek	Barron	LC05
Yarnell Creek	Barron	LC11

Appendix 4 - Lower Chippewa Basin 303(d) Waters

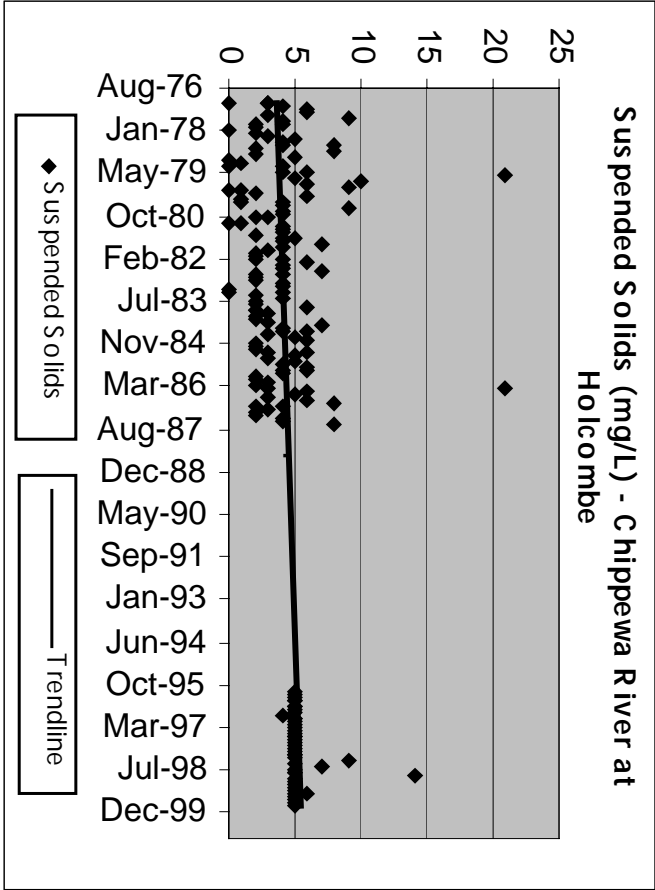
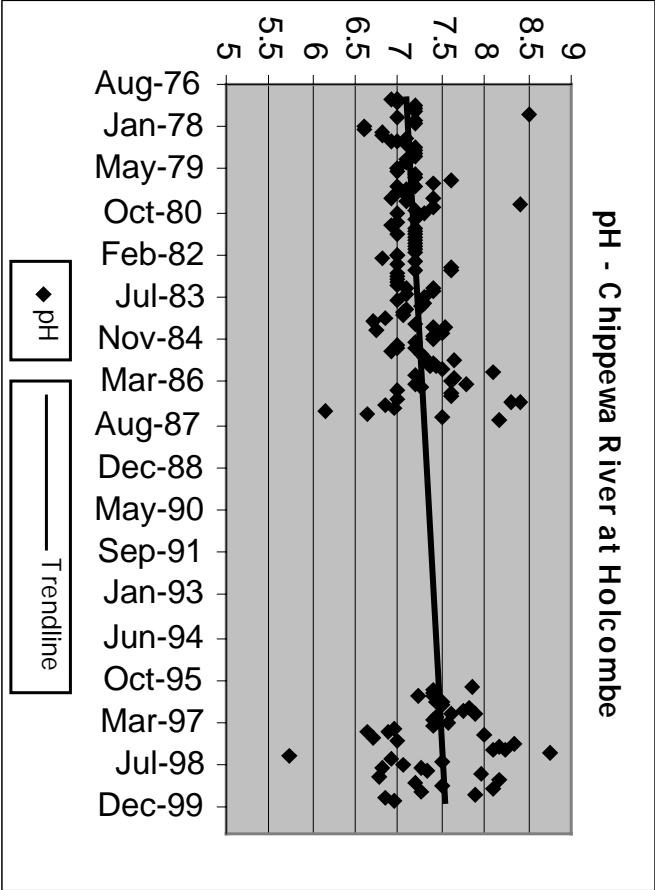
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Appendix 5 - Water Quality Trends Analysis for the Lower Chippewa River

CHIPPEWA FALLS



HOLCOMBE



Appendix 6 - Watershed Tables for the Lower Chippewa River Basin

Understanding the Watershed Tables

The tables in Appendix 6 contain a wealth of information about the surface water resources in the Lower Chippewa River Basin. They include current and potential water quality conditions; the extent of assessment work that has been conducted; water quality trends; sources of pollution that are impacting the water body; the types of impacts of those pollutant sources; and recommendations for monitoring and management.

The tables are organized by the Lower Chippewa Basin's 24 watersheds (Map 1). Within each watershed, the stream tables appear first, followed by the lake tables.

Stream Table Codes

This section describes the information contained in each column of the stream table, and defines the abbreviations used in each column. *A blank space anywhere in the table means that data is unassessed or unavailable.*

Stream Name

All named streams and some unnamed streams are listed. Stream names are those found on U.S. Geological Survey (USGS) quadrangle maps unless the Wisconsin Geographic Names Council has established a different name. Unnamed streams are identified by location of the stream mouth as indicated by township, range, section and quarter-quarter section.

Waterbody ID Code (WB ID Code)

All waterbodies require a unique waterbody identification code in order to link them to other databases.

Town Range Section

This column identifies the Township, Range, and Section where the mouth of the stream is located.

County

This column indicates the county or counties in which the stream is located.

Codified Use

The codified use of a waterbody is a classification that is formally and legally recognized by NR102 and NR104, Wis. Adm. Code, and is used to determine water quality criteria and effluent limits. The codified use classification for a stream is determined by applying formal stream classification procedures, which are undergoing revision. This column includes the codified use and the approximate length in miles of the stream portion meeting this classification, for example: Cold II/8.0.

Codified use categories, known as "Fish and Other Aquatic Life Uses" (NR102.04 (3)) are:

COLD (Cold Water Community): This codified use category includes surface waters that are capable of supporting a community cold water fish and other aquatic life or serving as a spawning area for cold water fish species. A COLD water community may be further

classified based on trout populations, as identified in *Wisconsin Trout Streams* (DNR Publ. 6-3600[80]).

Class I: High-quality stream where populations are sustained by natural reproduction.

Class II: Stream has some natural reproduction but may need stocking to maintain a desirable fishery.

Class III: Stream has no natural reproduction and requires annual stocking of legal-size fish to provide sport fishing.

Note 1: The Bureau of Fisheries Management has classified some streams as trout streams under NR1.02 (7) *after* the publication of *Wisconsin Trout Streams* (1980). These streams are not formally classified as COLD trout waters until code revisions of NR102 and NR104 are completed and approved. Currently, the "default" code (WWSF-Warm Water Sport Fish) is used for these streams and stream segments.

WWSF (Warm Water Sport Fish Communities): This category includes waters capable of supporting a community of warm water sport fish or serving as a spawning area for warm water sport fish. WWSF is the default Codified Use classification for streams that do not otherwise have an identified Codified Use.

WWFF (Warm Water Forage Fish Communities): This category includes surface waters capable of supporting an abundant, diverse community of forage fish and other aquatic life.

LFF (Limited Forage Fishery): This category includes surface waters of limited aquatic life use capacity due to low flow, naturally poor water quality or poor habitat. These surface waters are capable of supporting only a limited community of tolerant forage fish and aquatic life.

LAL (Limited Aquatic Life): This category includes surface waters that are severely limited for aquatic life use because of low flow and naturally poor water quality or poor habitat. These surface waters are capable of supporting only a limited community of aquatic life.

In addition, the codified use column identifies **ORW** (Outstanding Resource Waters) and **ERW** (Exceptional Resource Waters) streams listed in NR102.10 and NR102.11. Technically, ORW/ERW waterbodies are not "Fish and Aquatic Life Use" designations. The ORW/ERW designation was developed for the WDNR antidegradation program. These waterbodies also receive a "Fish and Aquatic Life Use" designation, as listed above, for the purpose of determining water quality criteria.

ORW (Outstanding Resource Waters): These waters have excellent water quality and high-quality fisheries. They do not receive wastewater discharges. No point source discharges will be allowed in the future, unless the quality of such discharges meets or exceeds the quality of the receiving water. This classification includes national and state Wild and Scenic Rivers and the highest quality Class I trout streams, as listed in NR102.10.

ERW (Exceptional Resource Waters): These waters have excellent water quality and valued fisheries but may already receive wastewater discharges or may receive future discharges necessary to correct environmental or public health problems. This

classification includes all Class I trout streams identified in *Wisconsin Trout Streams* (1980) that are not listed as ORW, as well as additional cold and warm water streams listed in NR102.11.

Existing Biological Use

This column indicates the *biological* use that the stream or stream segment currently supports. The Existing Biological Use categories are defined in NR102 (04)(3) under "Fish and Aquatic Life Uses", and are the same categories used for the Codified Use column, as described above. The Existing Biological Use designation is based on the current condition of the surface water and the associated biological community. Information in this column is not used for regulatory purposes.

Additional biological use categories identified in this column include:

303(d): These streams have been identified as a 303(d) listed impaired water. The 303(d) list identifies waters that are not currently meeting water quality criteria for specific substances or designated uses. See Chapter 3 for a discussion of Impaired Waters.

INT (Intermittent): These streams are identified as *intermittent* (not continuously flowing).

A stream may not have the same Codified and Existing Biological uses. For example, a stream may have biological conditions of a COLD trout stream. However, if the stream is not identified as COLD in *Wisconsin Trout Streams* (1980) or NR102 or NR104, it will receive the "default" Codified use of WWSF until code revisions change its Codified use.

Attainable Biological Use (Attainable or Potential Biological Use)

This column indicates the biological use that the investigator believes the stream or stream segment could achieve through proper management of "controllable" pollution sources. Beaver dams, hydroelectric dams, low gradient streams, and low flows that are naturally occurring are generally not considered to be "controllable" problems. The Attainable Biological (or potential) use may be the same as the Existing Biological Use or it may be higher. Abbreviations for "Attainable Biological Use" are the same as those used in the "Existing Biological Use" column.

Supporting Use Level (the extent to which a stream supports its Attainable Biological Use)

This column indicates the extent to which a stream meets, or is threatened in meeting, its Attainable Biological Use. This column shows the relationship between the stream's Existing and Attainable Biological Use. Chemical, physical (habitat, morphology, etc.) and biological information or direct observation and professional judgment are used to make this determination. Biological data is considered to be the most important information in determining the Supporting Use designation. Supporting Use categories are:

FULLY (Fully Supporting): The Existing Use is the same as the Attainable Use. The stream or stream segment is *not affected* by "controllable" pollution sources. Stream segments that are impacted by *culturally irreversible* pollution sources are also designated as FULLY Supporting. For example a river system with an "optimally operating" dam (minimal to no effect on the fish and aquatic life community assemblage, productivity, and diversity) is considered FULLY Supporting. On the other hand, poorly operating dams are *not* considered "culturally irreversible" and their effect on biological

resources is factored into the Supporting Use designation (see PART - Partially Supporting, below).

FULLY-THR (Fully Supporting, but Threatened): The Existing Use is the same as the Attainable Use, but there is a *clear and imminent* "threat" to the existing level of biological productivity and ecological health. Examples of threats include rapid commercial, residential, and/or industrial development in the watershed, the advent of large-scale industrial operations in the watershed, or channel modifications that have been, or will be permitted, or cannot be regulated under existing state or federal rules (i.e., drainage districts).

PART (Partially Supporting): The Existing Use is classified as the same as the Attainable Use, except that improved management practices could enhance the overall ecological health of the biological community. For example, dam operations could be modified to reduce the impact of hydrologic regimes on the biological community.

NOT (Not Supporting): The Existing Use is one or more Codified Use classifications below the Attainable Use. These Codified Use categories include COLD (I, II and III), WWSF, WWFF, LFF and LAL. For example a stream is considered NOT supporting if its Existing Use is WWFF while its Attainable Use is WWSF. The Existing Use impairment is considered reversible by improving management practices.

Assessment Level (Level of assessment the stream has received)

This column describes the quality of resource information that is available on a waterbody. These categories have been agreed upon for information included in Wisconsin's Water Quality Assessment Report to Congress (305[b]).

Mon (Monitored): A stream or stream segment is classified as "monitored " if *site-specific* data has been collected in the past five years, and is adequate to assess the quality or integrity of a resource. The WDNR or others can collect the data. The data must be adequate to develop a best professional judgment determination of the Existing and Attainable uses, and to determine the extent to which a stream supports its Attainable Use.

Eval (Evaluated): A stream is classified as "evaluated" if information *other than* site-specific data is adequate to determine the Existing and Attainable uses, and to determine the extent to which a stream supports its Attainable Use. Data sources that are adequate to "evaluate" a stream include site-specific data that is more than five years old, information on file provided by the public or others, and best professional judgment of a WDNR biologist or a WDNR fish manager.

Un (Unassessed): The available data on a stream is inadequate to consider the stream to be either Monitored or Evaluated

Resource Trend

This column indicates resource changes over time, and can be based upon best professional judgment alone or in combination with resource data trends. The trend category should indicate an actual change in waterbody condition, and not be an artifact of increased data collection. Trend categories include:

Imp - Improving
Stab - Stable
Dec - Declining
Unk (or blank) - Unknown

Sources and Impacts

These two columns indicate probable **sources** of impact to the stream and the **impacts**, or water quality problems that are present in the stream. Sources and impacts are identified using the best professional judgment of field staff. The following table explains the source and impact codes used in these columns. There is almost always a complex relationship between pollutant sources and resource impacts.

SOURCE	
BY - Barnyard or exercise lot runoff	LF - Landfill
CE - Construction site erosion	MS - Mine wastes and/or roaster piles
CL - Cropland erosion	NMM - Non-metallic mining
CM - Cranberry marsh	NPS - Unspecified nonpoint sources of pollution
DEV - Intense development pressure	OBS-M - Manmade obstructions to flow such as culverts bridges fences & stream crossings (excluding dams)
EX - Exotic species	OBS-N - Natural obstructions to flow, including thick streambank brush, debris, dams and reed canary grass
EX-PL - Exotics - purple loosestrife	PSB - Pastured streambank
EX-RC - Exotics - reed canary grass	PSI - Point source industrial discharge
F - Forestry activities	PSM - Point source municipal treatment plant discharge
FL - Flooding	PWL - Pastured woodlot
FS-BrN - A natural barrier to fish and aquatic organisms. Examples: Waterfalls and Rapids	RS - Roadside erosion
HM-DM - Hydrological modification caused by dam	SB - Streambank erosion
HM-DR - Hydrological modification caused by ditching or dredging	URB - Urban storm water runoff

IMPACT	
CL - Chloride toxicity	NH3 - Ammonia toxicity
COM - Competition or encroachment by introduced species	NUT - Excessive nutrient enrichment
DO - Low dissolved oxygen concentration	ORG - Organic chemical toxicity or bioaccumulation
FAD - Fish advisory	pH - Extreme high or low pH or fluctuations
FLOW - Stream flow fluctuations caused by unnatural conditions	PCB - Bioaccumulation of PCBs

HAB - Habitat degradation (scouring etc.)	PST - Pesticide/herbicide toxicity
HG - Mercury advisory	SC - Sediment contamination
HM - Heavy metal toxicity	SED -In-stream sedimentation
MAC - Undesirable rooted aquatic plant (macrophyte) or algal growth	TEMP - Extreme high or low temperature or fluctuations
MIG - Fish migration interference	TOX - General toxicity problems
	TURB - Turbidity problems

Monitoring Activity/Status/Date/Rank

The monitoring activity column includes a list of monitoring activities that have taken place on the waterbody in the past 5 years *or* are recommended for the future. These activities are described in the list below. Monitoring activities that do not include a status, rank or dates are simply suggestions for future monitoring. Examples include:

- ATOX/R/H (Aquatic Toxicity testing is Recommended, and is a High priority)
- BASE/C/1999 (Baseline monitoring was Completed in 1999).

Status: This indicates the status identified for each monitoring activity.

R=Recommended, **P**=Planned, **O**=Ongoing, **C**=Complete

Date: If the monitoring activity is planned or has already been completed, the planned or completion date is included.

Rank: Each of the listed monitoring activities are also assigned a priority rank, based on the best professional judgment of field staff.

L=Low, **M**=Medium, **H**=High

Monitoring Activity Codes

ATOX (Aquatic Toxicity Monitoring) - The collection of information on the concentrations of priority toxic pollutants in sediments and fish in Wisconsin's surface waters by collecting and analyzing samples from a subset of the baseline sites to obtain a broad scale coverage of the condition of surface waters.

BASE (Baseline-Wadeable & Non-Wadeable Stream Monitoring) - The collection of a suite of physical and biological parameters that identify the status or baseline condition of a stream. Those parameters include stream flow, physical habitat measurements, catch per unit effort for all species of fish and selective invertebrate sampling. Indices are calculated for fish habitat (HAB), fish community health (IBI), fish abundance (CPE) and organic pollution (HBI).

BUG - The collection of aquatic macroinvertebrates to characterize the overall biological health of a stream.

AMB (Ambient Stream Monitoring) - The collection of ambient stream water chemistry samples to provide an index of water quality conditions.

CT - Continuous temperature monitoring with the installation of data recorders at monitoring sites.

DO - Continuous dissolved oxygen monitoring with the installation of data recorders at monitoring sites.

FL - Stream flow monitoring.

FS-Comp (Comprehensive) - The collection of a suite of fisheries information on streams specifically aimed at identifying the abundance of fish populations. This includes catch per unit effort and/or population estimates. Data is often quantified as number per mile or pounds per acre.

FS-Hab - The collection of physical data used to evaluate the condition of fish habitat before and after implementation of an in-stream habitat management action. There are standardized Habitat Rating Systems used for streams greater than 10 meters and for streams less than 10 meters in width.

FS-Other – The collection of all other fisheries data that is not specifically taken to document the baseline (BASE) or comprehensive (FS-Comp) condition of fisheries resources. These monitoring activities tend to be stand-alone sampling techniques such as fish abundance (CPE), or fish community health (IBI).

FS-Regs Eval – The collection of fisheries information used to assess the net impact of a new regulation such as size and bag limit changes, seasons, quotas, refuges, bait and gear restrictions, etc.

FS-Stk Eval (Stocking) – The collection of fisheries data used to determine the success or failure of stocking various strains, sizes and densities of fish.

FS-MaxMin – The collection of water temperature range data using maximum/minimum thermometers.

FS-Tis - The collection of fish tissue for fish toxicity evaluations. Examples include mercury and PCBs.

STOX (Sediment Toxicity Testing) - The collection of sediment samples for toxicity testing. Examples include toxic metals and organic compounds.

WC - Water chemistry sampling includes a collection of samples for dissolved oxygen, temperature, pH, phosphorus or other parameters.

Management Activity/Status/Date/Rank

The management activity column includes a list of management activities that have taken place on the waterbody in the past 5 years *or* are recommended for the future. These activities are described in the list below. Management activities that do not include a status, rank or dates are simply suggestions for future management. Examples include:

- AB/O/H (Agriculture Best management practices are Ongoing, and are a High priority)
- BS/C/98 (Bank Stabilization was Completed in 1998)

Status: This indicates the status identified for each management activity.

R=Recommended, **P**=Planned, **O**=Ongoing, **C**=Complete

Date: If the management activity is planned or has already been completed, the planned or completion date is included.

Rank: Each of the listed management activities are also assigned a priority rank, based on the best professional judgment of field staff.

L=Low, **M**=Medium, **H**=High

Management Activity Codes

AB (Agricultural Best Management Practices) - Practices designed to reduce pollutant loads carried to surface waters and groundwater from agricultural land uses. Examples include grassed waterways, nutrient and pest management, barnyard controls, cropland practices to reduce erosion.

BC (Beaver Control) – Practices that reduce the thermal or physical impacts of overabundant beaver populations and their dams on cold water resources. This may include activities such as trapping, dam removal, and vegetative management.

BFR (Base Flow Regulation) - Activities that promote maintenance of stream base flow. Examples include regulating flow regimes of dams, and restoration of wetlands.

BS (Bank Stabilization) – A practice used to reduce bank erosion and sediment deposition in waterways. Examples include planting riparian buffer strips, rip rapping, sloping, grading and seeding or bioengineering techniques.

DR (Dam Removal and Restoration) - Removal of a dam and associated activities to restore a natural and/or functional river or stream ecosystem.

EXC (Exotic Species Control) - Control or removal of exotic and nuisance species by chemical, biological or physical means.

ES (Endangered Species) - Management actions to protect identified endangered or threatened aquatic or terrestrial species and associated habitats.

FC (Flood Control) – Upland management actions to reduce the impacts of downstream flooding on stream banks and fish habitat. Examples include dry dams, grass waterways, gully stabilization, and improved infiltration through establishment of vegetative cover.

FE (Fencing) –Upland management actions to limit or prevent livestock from damaging stream banks, fish habitat and stream corridors. Techniques may include rotational grazing, livestock watering areas or devices and fencing.

FS-Br (Fish Barrier) - In-stream management actions used to prevent or exclude upstream or downstream movement of detrimental species of fish. Examples include low head dams, electric weirs, gates or screens.

FS-PS (Fish Passage) - Modifications to manmade or natural fish barriers to allow fish passage, providing systemic benefits to the aquatic community.

FS-Ctrl (Rough Fish Control) –Instream management actions to reduce or control over abundant or nuisance fish populations. Examples include rough fish removal by commercial fishing, netting, seining, shocking or chemical treatment of waterways.

FS-Regs (Fish Regulations) - Management actions that restricts the harvest or harvest method of sport fisheries. Examples include regulation of size and bag limits, season length, refuges, and gear and bait restrictions.

FS-ST (Stocking and Transfer) –The stocking of fish raised in hatcheries or the transfer of fish from other waterways to supplement natural reproduction of native species or to create a fishery for a new species.

IHI (Instream Habitat Improvement) – Instream management actions to improve habitat and sport fish populations. Examples include the installation of artificial banks (boom covers), large woody debris, rip rap, boulder retards and other similar devices.

LA (Land Acquisition and Streambank Protection) - Acquisition of protective easements or fee title lands to protect or enhance important or critical habitat, and to provide recreational access.

NPS (Nonpoint Source) - Control of nonpoint sources of pollution, through selection of a stream or lake watershed for Priority Watershed Program funding.

PDR (Point Discharge Regulation) - Control of pollution from point source discharges through regulatory programs.

PLAN (Planning Grant) - Support of management planning through state-funded planning grants.

PROT (Protection Grant) - Support of resource protection activities through state-funded protection grants.

TMDL (Total Maximum Daily Load) - Establishment of a total maximum daily load for pollutant sources that are impairing the water body.

UB (Urban or Industrial Best Management Practices) - Management practices that reduce pollutant loads carried to surface waters and groundwater from non-agricultural land uses. Examples include stormwater infiltration, stormwater detention, construction site erosion control, and other pollutant reduction practices.

WR (Wetland Restoration) - Management actions to restore or enhance wetland habitat. Examples include breaking of drain tile and ditch plugs.

Refs (References)

Information included in the stream tables is derived from the knowledge of agency staff and from various studies conducted by the DNR and other agencies. The information is now housed in DNR files. For more in-depth information contact the Eau Claire DNR Service Center.

CHIP CO-1996 - Chippewa County Land Conservation Department Study 1996

LCRSNA - Lower Chippewa River State Natural Area 2000 Study

FH-1961 - 2001 - Studies completed by the DNR Fisheries & Habitat Bureau

Schreiber-1995 - Study completed by Ken Schreiber - Eau Claire Service Center 1995

UWEC-1999 - University of Wisconsin-Eau Claire 1999 Study
UWSP-1993 - University of Steven's Point 1993 Study
WR-1991 - DNR Water Resources Bureau 1991 Study
WRM-1992 - DNR Water Resources Management Bureau 1992 Study

Lake Table Codes

This section describes the information contained in each column of the lake table, and defines the abbreviations used in each column. *A blank space anywhere in the table means that data is unassessed or unavailable.*

Lake Name

All named lakes and some unnamed lakes larger than 10 acres in size are listed. Cold water spring or trout ponds that are smaller than 10 acres in size may also be listed. Lake names are those found on U.S. Geological Survey (USGS) quadrangle maps unless the Wisconsin Geographic Names Council has established a different name. Some lakes are known locally by other names; where available, local names have been listed with the official name. Township, range, section and quarter-quarter section identify unnamed lakes.

Waterbody ID Code (WB ID Code)

All waterbodies require a unique waterbody identification code in order to link them to other databases.

Town Range Section

This column identifies the Township, Range, and Section where the lake is located.

County

This column indicates the county or counties in which the lake is located.

Surface Area

This column indicates the surface area, in acres, as listed on the WDNR Master Waterbody File, *Wisconsin Lakes* (WDNR PUBL-FM-800-95REV) and the *Lower Chippewa River Water Quality Management Plan* (1996).

Max Depth and Mean Depth

These two columns indicate the maximum depth and mean depth as listed in *Wisconsin Lakes* (WDNR PUBL-FM-800-95REV) and the *Lower Chippewa River Water Quality Management Plan* (1996)

Access

This column categorizes the type of public access available on the lake. If there is more than one access on a lake, only the most highly developed type of public access is listed in this column.

BR = Boat Ramp

BF = Barrier-free boat ramp (boating dock and/or wheelchair access)

P = Barrier-free pier (wheelchair access)

T = Walk-in trail

R = Roadside access

W = Wilderness access

BW = Barrier-free wilderness access (wheelchair access)

NW = Navigable water access to lake

X = Some type of access available, but not specified

Lake Type

This column categorizes the limnological characteristics of the lake based on physical and chemical properties. Each lake type category generally supports characteristic aquatic plant and animal communities. Lake type classifications and qualifying criteria are:

DG (Drainage lake) - Impoundments and natural lakes which have both a surface water (stream) inlet and outlet. The main water source to these lakes comes from stream drainage.

DR (Drained lake) - Natural lakes with the main water source dependent on the groundwater table and seepage from adjoining wetlands. These lakes seldom have an inlet but will have an outlet of very little flow. They are similar to the seepage lakes (below) except that they have an outlet.

SE (Seepage lake) - Landlocked lakes which have no surface water (stream) inlet or outlet. The groundwater table, and sediments that seal the bottom of the lake maintain water level. On some lakes, an intermittent outlet may be present.

SP (Spring lake) - Spring lakes seldom have an inlet, but always have an outlet of substantial flow. The main water source to these lakes comes from groundwater (springs).

IMP (Impoundment) - This code following the lake type code (above) indicates that an impounding structure (dam) located on a stream created that lake.

NLD (Dammed Natural Lake) - This code following the lake type code (above) indicates that dam is present on a natural lake.

Winterkill

Winterkill (winter oxygen depletion) is a common problem in many shallow Wisconsin lakes. A kill can occur when at least four inches of snow cover the lake, which prevents sunlight from reaching the water. All photosynthesis stops and plants begin to die and decompose. The extent of oxygen loss depends on the total amount of plant, algae and animal matter that decays. Drought increases the chance of winterkill by reducing the volume of water in the lake.

YES - Indicates the lake has experienced winterkill at least once.

NO (or blank) - Indicates winterkill is not known to have occurred.

NO-A - No winterkill has taken place since aeration units were installed in the lake.

Map

YES - An official lake map is available for the lake.

NO (or blank) - An official lake map is not available for the lake.

Phosphorus Sensitivity

This column indicates a lake's classification, based on an analysis of the lake's relative sensitivity to phosphorus loading and existing trophic (water quality) conditions. These phosphorus sensitivity classifications are used to prioritize lakes for nutrient control management. Lakes in each general classification are subdivided into management groups based on data needs or existing water quality conditions, and to establish appropriate management recommendations and priorities.

CLASS 1		CLASS 2	
GROUP A	Existing water quality fair to excellent	GROUP A	Existing water quality fair to excellent
	Potentially most sensitive to increased phosphorus loading		May not be as sensitive to phosphorus loading as Class 1 lakes
	High priority for protection management		Medium to high priority for protection or use impairment management
	Recommend impact assessment monitoring if water quality is less than achievable		
GROUP B	Existing water quality poor to very poor	GROUP B	Existing water quality poor to very poor
	Less sensitive to increased phosphorus loading		Low sensitivity to increased phosphorus loading
	Use impairment management recommended where appropriate		Low priority for protection management
	Medium priority for protection management		
GROUP C	Data inadequate to assess trophic condition	GROUP C	Data inadequate to assess trophic condition
	Classification monitoring recommended		Classification monitoring recommended
GROUP D	Water quality cannot be adequately assessed with trophic status index	GROUP D	Water quality cannot be adequately assessed with trophic status index
	Physical and/or biological attributes make lake potentially less sensitive to increased phosphorus loading		Physical and/or biological attributes make lake potentially less sensitive to increased phosphorus loading
	Should be evaluated for re-classification if conditions change		Should be evaluated for re-classification if conditions change

Trophic Class and TSI (Trophic Status Index)

These two columns indicate a lake's classification based on water quality factors including concentrations of dissolved oxygen, phosphorus and chlorophyll in water samples. Trophic State Index (TSI) values are calculated for a lake based on a series of water quality sample data. These categories are general indicators of lake productivity.

Olig (Oligotrophic) - TSI values of 39 or less: These lakes are generally clear, cold and free of many rooted aquatic plants or large blooms of algae. Because they are low in nutrients, oligotrophic lakes generally do not support large fish populations. However, they often have an efficient food chain with a very desirable fishery of large predator fish.

Meso (Mesotrophic) - TSI values of 40 - 49: These lakes are intermediate between oligotrophic and eutrophic. The bottoms of these lakes are often devoid of oxygen in late summer months, limiting available habitat for cold water fish and resulting in release of phosphorus from lake sediments into the water column.

Eutr (Eutrophic) - TSI values of 50 or greater: These lakes are high in nutrients. They are likely to have excessive aquatic vegetation and/or experience frequent or severe algae blooms. They often support large fish populations, but are also susceptible to oxygen depletion. Small, shallow lakes are especially vulnerable to winterkill (see above), which can reduce the fishery diversity and quality.

Biological Use

This column indicates the *biological* use that the lake currently supports. The Biological Use designation is based on the current condition of the surface water and the associated biological community. Information in this column is not used for regulatory purposes.

CWSF (Cold Water Sport Fish Communities): This category includes lakes capable of supporting a community of cold water sport fish or serving as a spawning area for cold water sport fish.

TSSF (Two-Story Sport Fishery): This biological use category includes lakes that are capable of supporting a community cold water fish and also a community of warm water sport fish.

WWSF (Warm Water Sport Fish Communities): This category includes lakes capable of supporting a community of warm water sport fish or serving as a spawning area for warm water sport fish.

WWFF (Warm Water Forage Fish Communities): This category includes lakes capable of supporting an abundant, diverse community of forage fish and other aquatic life.

LFF (Limited Forage Fishery): This category includes lakes of limited aquatic life use capacity due to low flow, naturally poor water quality or poor habitat. These lakes are capable of supporting only a limited community of tolerant forage fish and aquatic life.

LAL (Limited Aquatic Life): This category includes lakes that are severely limited for aquatic life use because of low flow and naturally poor water quality or poor habitat. These surface waters are capable of supporting only a limited community of aquatic life.

Additional biological use categories identified in this column include:

303(d): These lakes have been identified as 303(d) listed impaired lakes. The 303(d) list identifies waters that are not currently meeting water quality criteria for specific substances or designated uses. See Chapter 3 for a discussion of Impaired Waters.

ORW (Outstanding Resource Waters): These waters have excellent water quality and high-quality fisheries. They do not receive wastewater discharges. No point source discharges will be allowed in the future, unless the quality of such discharges meets or exceeds the quality of the receiving water.

ERW (Exceptional Resource Waters): These waters have excellent water quality and valued fisheries but may already receive wastewater discharges or may receive future discharges necessary to correct environmental or public health problems.

Rec Use (Recreational Use)

This category indicates the type of recreational activities known to be taking place on the lake, and the intensity of use.

BT - Boating,

FS - Fishing,

SW - Swimming,

WS - Water Sports

Use Intensity: **L**=Low, **M**=Medium, **H**=High, **U (or blank)**=Unknown.

LMO (Lake Management Organization)

This column indicates whether or not a lake management organization (LMO) exists for the lake. A LMO can range from a small, loosely organized group of lake property owners, to an association or to a district, complete with by-laws and taxing authority.

Y - Indicates that a LMO does exist

ASSC (Lake Association) - Criteria for Lake Association status are spelled out in Section 144.253(1), Wisconsin Statutes. Generally, an Association must be at least 25 members in size, allow membership to anyone living within one mile of the lake for at least one month per year, and have lake protection and improvement as its primary purpose.

DIST (Lake District) - Criteria for Lake District status can be found in Chapter 33, Wisconsin Statutes. A Lake District is a special purpose unit of government, which is formed through local government approval processes. It has specified boundaries, and its main purpose is to improve or protect a lake and its watershed.

Rec (LMO Recommended) - It is recommended that a LMO be developed.

If blank - no lake management association exists.

Sources and Impacts

These two columns indicate probable **sources** of impact to the lake and the **impacts**, or water quality problems that are present in the lake. Sources and impacts are identified using the best professional judgment of field staff. The following tables explain the source and impact codes used in these columns. There is almost always a complex relationship between pollutant sources and resource impacts, and the table below is not intended to show a relationship between specific sources and impacts.

SOURCE	
AGSPR - Agricultural land spreading site	NPS - Unspecified nonpoint sources of

	pollution
BY - Barnyard or exercise lot runoff (animal operations)	PS - Point sources of pollutants
CE - Construction site erosion	PSB - Streambank pasturing
CL - Cropland erosion	PWL - Woodlot pasturing
DEV - Intense development pressure	RS - Roadside construction erosion
EX-CP - Exotics - curly leaf pondweed	SB - Streambank erosion
EX-EWM - Exotics - Eurasian milfoil	SEP - Septic systems are or may be causing water quality problems
EX-PL - Exotics - purple loosestrife	URB - Urban storm water runoff
HM - Hydrological modification caused by damming, ditching, or wetland drainage	WLF - Water level fluctuations
INT - Internal loading	

IMPACT	
ACC - Access problems. The general public is unable to access a navigable waterbody, which is considered a water of the state.	NUT - Excessive nutrient enrichment
ALG - Undesirable algae growth	SED - Excessive Sedimentation
BAC - Bacteria monitoring	TOX - General toxicity problems
DO - Low dissolved oxygen concentration	TURB - Turbidity problems
HAB - Aquatic or terrestrial habitat degradation	WKILL - Winterkill that occurs as a result of human activity
HG - Mercury advisory	
MAC - Undesirable macrophyte plant growth	

Monitoring Activity/Status/Date/Rank

The monitoring activity column includes a list of monitoring activities that have taken place on the lake in the past 5 years *or* are recommended for the future. These activities are described in the list below. Monitoring activities that do not include a status, rank or dates are simply suggestions for future monitoring. Examples include:

- FS-Comp/R/M (Comprehensive Fish Survey is Recommended, and is a Medium priority)
- StkEval/C/98 (Fish stocking evaluation was Completed in 1998).

Status: This indicates the status identified for each monitoring activity.
R=Recommended, **P**=Planned, **O**=Ongoing, **C**=Complete

Date: If the monitoring activity is planned or has already been completed, the planned or completion date is included.

Rank: Each of the listed monitoring activities are also assigned a priority rank, based on the best professional judgment of field staff.

L=Low, **M**=Medium, **H**=High

Monitoring Activity Codes

AMB (Ambient Lake Monitoring) - The collection of ambient lake water chemistry samples to provide an index of water quality conditions.

BASE-T (Baseline Trend Monitoring) - The collection of a suite of physical and biological parameters that provide an assessment of trends in lake quality between lakes and over time. On a set number of lakes, water chemistry data are collected every other year and data on habitat and the fish community are collected every five years. Parameters include the levels of a variety of chemical components, physical habitat measurements, and the catch-per-unit-effort for all fish species collected.

BASE-S (Baseline Status Monitoring) - The collection of a suite of physical, chemical and biological parameters that supplements more intensive data gathered from lakes included in the trends monitoring program. This data also establishes a baseline of information or status of a number of other lakes in the basin. The types of sampling are similar to the trends monitoring program, however water chemistry data are collected every five years.

CLA - chlorophyll a sampling

DF - Diagnostic or feasibility study, to determine watershed and lake management needs to protect or improve water quality.

DOT - The collection of a dissolved oxygen and water temperature profile, generally at regular depth intervals at the deepest spot of the lake.

FS-Comp (Comprehensive) - The collection of a suite of fisheries information on lakes specifically aimed at identifying the abundance of fish populations. This includes catch per unit effort and/or population estimates. Data is often quantified as number per acre.

FS-Hab – The characterization of habitat available to fish and other aquatic life in a lake. Habitat is identified in terms of both quantity and quality to determine needs for protection and/or enhancement of the current condition.

FS-K (Fish Kill) - An assessment of the extent and duration of fish kills, most often caused by low oxygen conditions, to identify further management needs including fish stocking.

FS-Other – The collection of all other fisheries data that is not specifically taken to document the baseline (BASE) or comprehensive (FS-Comp) condition of fisheries resources. These monitoring activities tend to be stand-alone sampling techniques such as fish abundance (CPE), fish community health (IBI), or fish habitat condition (HAB).

FS-Regs Eval – The collection of fisheries information used to assess the net impact of a new regulation such as size and bag limit changes, seasons, quotas, refuges, bait and gear restrictions, etc.

FS-Stk Eval (Stocking) – The collection of fisheries data used to determine the success or failure of stocking various strains, sizes and densities of fish.

FS-Tis - The collection of fish tissue for fish toxicity evaluations. Examples: mercury and PCBs.

FS-YOY (Young Of Year Fish) - Monitoring conducted to assess the level of natural reproduction of a specific year class of fish (usually sportfish species such as walleye or musky).

LTT (Long Term Trend Monitoring) - This is an intensive monitoring program which involves collecting data on water quality and other biological and physical conditions, five times per year for a period of 10 years, from 1986 - 1996.

MOD - Modeling of lake and watershed conditions to assist in development of management plans.

SED (Sediment) - The collection of sediment samples for chemistry testing. Samples are analyzed for bulk chemistry, metals and organic compounds.

SH-C (Self-Help Program - Chemistry) - Collection of water chemistry data by Lake Self-Help Program Volunteer Monitors. Data collected includes water clarity, chlorophyll concentration, phosphorus concentration and temperature profiles.

SH-E (Extended Self Help Program - Chemistry and DO) - Collection of water chemistry and dissolved oxygen data by Lake Self-Help Program Volunteer Monitors.

SH-P (Self-Help Program - Plants) - Collection of aquatic plant data by Lake Self-Help Program Volunteer Monitors

SH-S (Self-Help Program - Secchi) - Collection of water clarity (Secchi depth) data by Lake Self-Help Program Volunteer Monitors.

VEG (Vegetation Surveys) - Collection of data about the aquatic plant community by WDNR staff. Information collected includes species presence, frequency, density and maximum rooting depth along specified transects.

WC - Water chemistry sampling includes a collection of samples for dissolved oxygen, temperature, pH, phosphorus or other parameters.

Management Activity/Status/Date/Rank

The management activity column includes a list of management activities that have taken place on the lake in the past 5 years *or* are recommended for the future. These activities are described in the list below. Management activities that do not include a status, rank or dates are simply suggestions for future management. Examples include:

- SR/R/H (Shoreline habitat restoration is Recommended, and is a High priority)
- AER/O/H (Aeration is Ongoing, and is a High priority)

Status: This indicates the status identified for each management activity.

R=Recommended, **P**=Planned, **O**=Ongoing, **C**=Complete

Date: If the management activity is planned or has already been completed, the planned or completion date is included.

Rank: Each of the listed management activities is also assigned a priority rank, based on the best professional judgment of field staff.

L=Low, **M**=Medium, **H**=High

Management Activity Codes

AER - Installation of an aeration system to prevent winterkill conditions.

APMP - Development of an aquatic plant management plan.

APM-C (Aquatic Plant Management-Chemistry) - Control nuisance aquatic plants through chemical applications.

APM-M (Aquatic Plant Management-Mechanical) - Control nuisance aquatic plants by mechanical means, such as harvesting.

BS (Bank Stabilization) – A practice used to reduce bank erosion and sedimentation to waterways. Examples include planting riparian buffer strips, rip rapping, sloping, grading and seeding or bioengineering techniques.

CHP (Critical Habitat Protection) - Management activities which protect the current state of habitat critical to the survival of fish and other aquatic life, especially endangered, threatened, and rare species. Activities may include land acquisition, no-wake zones, and more restrictive criteria applied to aquatic plant management and water regulation activities.

CR (Chemical Rehabilitation) - Chemical treatments used to rehabilitate a lake ecosystem. Examples include removal of carp through chemical treatment.

D-SC (Dredging/Sediment Control) - Dredging or removal of lake sediments to improve lake water quality or habitat conditions.

ES (Endangered Species) - Management actions to protect identified endangered or threatened aquatic or terrestrial species and associated habitats.

EXC (Exotic Species Control) - Control or removal of exotic and nuisance species by chemical, biological or physical means.

FS-Br (Fish Barrier) - In-lake management actions used to prevent movement of detrimental species of fish. Examples include low head dams, electric weirs, gates or screens.

FS-Ctrl (Rough Fish Control) –Management actions to reduce or control over abundant or nuisance fish populations. Examples include rough fish removal by commercial fishing, netting, seining, shocking or chemical treatment of waterways.

FS-Regs (Fish Regulations) - Management actions that restricts the harvest or harvest method of sport fisheries. Examples include regulation of size and bag limits, season length, refuges, and gear and bait restrictions.

FS-ST (Stocking and Transfer) – Lake management actions to restore or enhance sport and nongame species. Examples include stocking fish raised in a hatchery or field transfer of wild stocks.

IHI (In-lake Habitat Improvement) - In-lake management actions to improve habitat for fish populations. Examples include the installation of log fish cribs, large woody debris, riprap, spawning reefs, half-logs and other similar devices.

INT-M (Internal Loading Management) - Management activities intended to reduce internal phosphorous loading such as alum treatment or summer aeration.

LA (Land Acquisition and Habitat Protection) - Acquisition of protective easements or fee title lands to protect or enhance important or critical habitat, and to buffer upland uses.

LMP (Lake Management Plan) - Development of a comprehensive lake management plan.

MAP - Development of a hydrographic (contour) map of the lakebed.

NPS (Non-Point Source) - Control of non-point sources of pollution, through selection of a stream or lake watershed for Priority Watershed Program funding.

PLAN (Planning Grant) - Support of management planning through state-funded planning grants.

PROT (Protection Grant) - Support of resource protection activities through state-funded protection grants.

SR (Shoreline Habitat Restoration) - Protection or restoration of shoreland vegetative habitat to promote native species diversity.

SZ (Shoreland Zoning) - Implementation and enforcement of shoreland zoning regulations.

TMDL (Total Maximum Daily Load) - Establishment of a total maximum daily load for pollutant sources that are impairing the water body.

WLM (Water Level Management) - A practice or strategy for managing water levels and water level fluctuations to enhance recreation, wildlife, habitat and property protection.

WR (Wetland Restoration) - Management actions to restore or enhance wetland habitat. Examples include breaking of drain tile and ditch plugs.

Refs (References)

Information included in the stream tables is derived from the knowledge of agency staff and from various studies conducted by the DNR and other agencies. The information is now housed in DNR files. For more in-depth information contact the Eau Claire DNR Service Center.

FH-96 - 99 - Studies completed by the DNR Fisheries & Habitat Bureau

PRATT 1994-2000 - Studies completed by Frank Pratt - DNR Northern Region

Appendix 7 - Watershed Ranking for Surface and Groundwater

This is a placeholder for the MSExcels file.

Appendix 8 - Public Lands in the Lower Chippewa Basin

State Parks

- **Brunet Island State Park** – Cornell: Framed by the Chippewa and Fisher Rivers, this island park's bays and lagoons offer a quiet respite. 1225 acres
- **Lake Wissota State Park** – Chippewa Falls: This park has 1,062 acres of primarily young rich forests and open prairie on a 6,300-acre manmade lake. It attracts hikers, campers, recreational boaters, and anglers after walleye, muskie, and bass. 1,062 acres

State Trails

- **Chippewa River State Trail:** A 20-mile trail linking Eau Claire with the Red Cedar Trail. The five miles adjacent to Eau Claire are paved for in-line skaters. River and rural scenery.
- **Old Abe State Trail:** Ride a scenic corridor between Lake Wissota and Cornell. Trail follows the Chippewa River and connects two state parks. Parallel horse trail connects to Lake Wissota State Park.
- **Red Cedar State Trail:** The trail shadows the steep walls of the Red Cedar Valley 14.5 miles from Menomonie to the Chippewa river Valley. Connects to the 20-mile Chippewa River trail.

State Recreation Areas

- **Hoffman Hills State Recreation Area – Menomonie:** A 60-foot observation tower offers sweeping views of this rugged hill country, wetlands, and restored prairie. Lots of watchable wildlife. 707 acres

Ice Age National Scientific Reserve

- **Chippewa Ice Age Moraine** – New Auburn: Situated along the Ice Age Trail, visitors enjoy unspoiled beauty with kettle lakes and many glacial features. The interpretive center sits atop a hill that was once a glacial lake bottom.

State Natural Areas

- **Bear Lake Sedge Meadow** - 190 acres in Barron County
Location: The natural area is located west of the village of Haugen in Township 36N, Range 12W, in portions of sections 11-12.
Description & Reason for Preservation: The site is owned by Barron County and the Village of Haugen, with a memorandum of understanding with the DNR. The sedge meadow provides habitat for several rare birds, most notably the yellow rail and the leConte's sparrow.
- **Blue Swamp** - 560 acres in Clark County
Location : The site is located on Clark County Forest land in Township 27N, Range 4W, in portions of sections 21 and 28.
Description & Reason for Preservation: The site is a sedge meadow, poor fen, and tamarack swamp and provides habitat for a diversity of species.
- **Putnam Park** - 105 acres in Eau Claire County
Location & Access: On the UW-Eau Claire campus. To the western portion, walk west from parking lot #4 along the interpretive trail into area. To the eastern portion, access via Putnam Drive, a one-way drive that bisects the area and starts across from parking lot #14.
Reason for Preservation: The site contains southern wet-mesic and northern dry-mesic forests with very diverse flora and fauna including one state-threatened plant species.

Description: Putnam Park consists of natural, mostly forested land that extends in a long curving, narrow strip through the city of Eau Claire. With varied topography, bedrock exposures, seepage springs, and a variety of soil types all in close proximity, Putnam Park possesses many plant and animal habitats. More than 400 species of plants, 100 species of birds in summer, 23 mammal species, and 6 reptiles, including the prairie skink, have been recorded within the park. Major forest types are northern dry-mesic with some impressive white and red pines and southern wet-mesic with river birch, silver maple, hackberry, red maple, and paper birch dominating.

Occasional tamarack and white cedar are found in the wettest portions, at the east end of the park.

- **Coon Fork Barrens** - 610 acres in Eau Claire County

Location: The site is situated close to Coon Fork County Park on Eau Claire County Forest land in Township 26N, Range 5W, in portions of sections 19, 20, 29, and 30.

Description & Reason for Preservation: Pine barrens make up this state natural area, providing excellent habitat for the federally endangered, Karner Blue butterfly. The County, together with the DNR, works to maintain this important habitat. Prescribed burning and timber management are the primary tools used to maintain this habitat.

- **Pea Creek Sedge Meadow** - 200 acres in Eau Claire County

Location: The site is located on Eau Claire County Forest land in Township 25N, Range 5W, in portions of sections 3 & 4.

Description & Reason for Preservation: The species of concern are the Northern Harrier and the Sedge Wren. Prescribed burning and prevention of water level manipulation are the primary tools for maintaining this habitat.

- **South Fork Barrens** - 120 acres in Eau Claire County

Location: The site is located in Township 26N, Range 5W, in portions of section 14 & 15.

Description & Reason for Preservation: The natural area consists of pine barrens which provide prime habitat for the endangered Karner Blue butterfly as well as a diversity of birds. Prescribed burning and timber management are the primary tools used to maintain this habitat.

- **Trenton Bluff Prairie** - 110 acres in Pierce County

Description: Trenton Bluff Prairie is a dry prairie on a southwest-facing slope in the Mississippi River Valley, about a mile away from the river. It consists of two units, the western portion consisting of two prairies separated by a wooded draw. The eastern portion is much steeper; an open cliff grades quickly into shrubby oak woods. The bluff summit rises some 300 feet above the flat, sandy river terrace. Vertical cliffs expose the bedrock layers, dolomite capping the basal sandstone. Dominant grasses on the dry prairie include Indian grass, little bluestem, big bluestem, side-oats grama, muhly grasses, and porcupine grass. Several Great Plains species are at their eastern range limit here: bladderpod, prairie sagewort, dragon sagewort, plains muhly, ground plum, and prairie larkspur. Reptile fauna includes milk snake, blue racer, and timber rattlesnake. Common nesting birds are house wren, rough-winged swallow, rufous-sided towhee, and field and lark sparrows.

Reason for Preservation: The prairie has been identified as the best remaining dry prairie in the region. Several rare plant species at the eastern edge of their range are found here including a state-endangered species.

Access: The two units are accessible from the junction of County Hwys. E and VV north of Hager City. The west unit is reached by taking County Hwy. E west 1.4 miles to the southeast boundary. The east unit is reached by taking County Hwy. VV north 0.25 mile to the southeast boundary.

- **Rush River Delta** - 325 acres in Pierce County

Description: The Rush River Delta forest is dominated by silver maple, with lesser amounts of willow, elm, cottonwood, and green ash. Wetter areas and the beach fringe are dominated by dense thickets of willow. Shrubs are scarce; only occasional lianas of grape and woodbine are

present. The ground is covered with large patches of wood nettle. Several wet depressions are vegetated by river bulrush and knotweeds. A sand spit extends into Lake Pepin at the Rush River mouth. Gulls and terns nest on the beach and forage in the adjacent shallow bay. Turtles also use the sandy shore as nest sites. Woodland bird species abound including eastern wood pewee, brown creeper, blue-gray gnatcatcher, yellow-throated vireo, warbling vireo, prothonotary and cerulean warblers, American redstart, northern oriole, and several woodpecker species.

Reason for Preservation: This site contains a southern wet-mesic forest on a depositional delta. Two state-threatened bird species nest on the site.

Access: From the intersection of State Hwy. 35 and County Hwy. A west of Maiden Rock, go east on State Hwy. 35 0.1 mile across Rush River. The natural area lies south of Hwy. 35.

- **Morgan Coulee Prairie** - 54 acres in Pierce County

Description: Morgan Coulee Prairie lies on a steep to moderately steep slope with a southern exposure. The entire slope from coulee bottom to bluff top is prairie. Dominant grasses include big and little bluestems, side-oats and hairy gramas, Indian grass, porcupine grass, northern dropseed, and several muhly grasses. The forbs are equally diverse, highlighted by such showy species as asters, milkweeds, prairie clovers, evening primrose, bush clover, cream wild indigo, blazing stars, and prairie larkspur. At the bluff top is a southern dry oak forest. Between these communities is bur oak savanna, dominated by open-grown, gnarled bur oaks. The brushy savanna edge contains hazelnut, bittersweet, smooth sumac, and dogwoods. Scattered limestone outcrops support a community of lichens and ferns.

Reason for Preservation: The site contains the second largest dry prairie in the west central region and a small bur oak savanna.

Access: From the intersection of State Hwy. 35 and County Hwy. A west of Maiden Rock and 0.1 mile west of the Rush River, go east on Hwy. 35 0.25 mile, then northwest on Cemetery Road 0.1 mile, then northwest on East Rush River Road 3.1 miles, then east on Morgan Road 0.2 mile to the southwest corner of the site.

State Wildlife Areas

- **Big Beaver Creek Wildlife Area** is in Dunn County, 8 miles NE of Boyceville and is 584 acres. The habitat is primarily stream, marsh, grassland, and forest, and supports waterfowl, grouse, beaver, muskrats, and deer.
- **Hay Creek Wildlife Area** is in Dunn County, 15 miles north of Colfax and is 375 acres. The habitat primarily stream, marshland and cropland, and supports grouse, waterfowl, deer, and beaver.
- **Otter Creek Wildlife Area** is in Dunn County, 6 miles NE of Wheeler, and is 402 acres.. The habitat is primarily stream, forest and marsh, and supports deer, grouse, waterfowl, beaver, muskrat and otter.
- **Lambs Creek Wildlife Area** is in Dunn County, 4 miles north of Menomonie and is 711 acres. The habitat is primarily stream, timber and marsh and supports deer, ruffed grouse, ducks, squirrels, rabbits, beaver, muskrat, and turkey.
- **Hay River Wildlife Area** is in Dunn County, 1 mile east of Wheeler and is 122 acres. The habitat is primarily river bottom and forest upland and supports deer, ruffed grouse, waterfowl, rabbits and furbearers.
- **Tom Lawin Wildlife Area** is in Chippewa County, 2 miles SE of Jim Falls and is 4000 acres (2000 owned and 2000 leased). The habitat is primarily marsh, farmland and upland forest and supports pheasants, ruffed grouse, rabbits, waterfowl, deer, furbearers, and deer.
- **Muddy Creek Wildlife Area** is in Dunn County, 2 miles west of Elk Mound and is 4,351 acres (3,185 owned and 1,166 acres leased). The habitat is primarily marsh, woodlots, stream, planted

prairie grass, and supports pheasants, rabbits, squirrels, ducks, deer, muskrats, ruffed grouse and turkey.

- **Eau Galle River Wildlife Area** is in Dunn County, 14 miles SW of Menomonie and is 237 acres. The habitat is primarily stream and forest and supports waterfowl, ruffed grouse, furbearers, turkeys and bald eagles.
- **Dunnville Wildlife Area** is in Dunn County, 5 miles south of Downsview and is 5,063 acres (3,673 owned and 1,388 leased). The habitat is primarily marsh, river bottom, farmland and planted prairie fields and supports ducks, pheasants, rabbits, grouse, deer, squirrels, furbearers, bald eagles and turkeys.
- **Rock Falls Wildlife Area** is in Dunn County, one mile SW of Rock Falls and is 271 acres. The habitat is primarily stream bottom, marsh, and planted prairie grass and supports pheasants, deer, waterfowl, furbearers, rabbits and squirrels.
- **Augusta Wildlife Area** is in Eau Claire County, 4 miles north of Augusta and is 2,100 acres. The habitat is primarily marsh and forest and supports ruffed grouse, deer, ducks, rabbits, squirrels, woodcock, bear, turkeys, waterfowl, furbearers and turkeys.
- **Pierce County Islands Wildlife Area** is in Pierce County, 1 mile west of Bay City and is 860 acres. The habitat is primarily river, sloughs and forest and supports deer, waterfowl and furbearers.
- **Pepin County Extensive Wildlife Habitat Area** is in Pepin County, 1 mile west of Durand and is 293 acres. The habitat is primarily river bottom, forest, marsh and planted prairie grass and supports deer, ruffed grouse, rabbits, squirrels, furbearers, waterfowl and turkeys.
- **Tiffany Wildlife Area** is in Buffalo and Pepin Counties on both sides of the Chippewa River between Durand and Nelson. Hwys 25 and 35 provide access to the property. The wildlife area consists of 12,720 acres, all state-owned. The habitat is primarily river slough, forest, lake, and marsh and supports numerous waterfowl, deer, ruffed grouse, turkeys, panfish, walleye, smallmouth bass, channel catfish, northern pike, massasauga rattlesnakes, red-shouldered hawks, blundings turtles, bald eagles, great egrets, crystal darters, river red horse, blue suckers. Other recreational opportunities include berry picking, canoeing, cross-country skiing, hiking (no marked trails), camping (by permit only), fishing, and birdwatching.

State Fishery Lands (Beaster Gazetteer/Schott Property Manager's List)

- **Bolen Creek Fishery Area** - Dunn County
- **Duncan Creek Fishery Area** - Chippewa County
- **Elk Creek State Fishery Area** - Chippewa County
- **Engle Creek Springs State Fishery Area** - Barron County
- **Hay Creek State Fishery Area** - Chippewa County
- **Lake Menomin Fishery Area** - Dunn County
- **McCann Creek State Fishery Area** - Chippewa County
- **Otter Creek State Fishery Area** - Dunn County
- **Pine Creek State Fishery Area** - Barron County
- **Sand Creek Fishery Area** - Chippewa County
- **Yellow River State Fishery Area** - Barron County
- **Lowes Creek State Fishery Area** - Eau Claire County

US Fish and Wildlife Service Waterfowl Production Areas (WPAs)

- **Strehlau WPA**: Dunn County, Sec 14, T28N-R17W; 80 acres
- **Red Cedar WPA**: Dunn County, Sec 14 & 23, T28 N-R17W; 268 acres
- **Cook's Pond WPA**: Dunn County, Sec 33 & 34, T28N-R17W; 80 acres
- **Iron Creek WPA**: Dunn County, Sec 35, T28N-R17W; 47 acres
- **Rock Creek WPA**: Dunn County, Sec 26, 35, & 36, T26-27N-R11W; 479 acres

Appendix 9 - Prioritized Natural Resources Issues

Lower Chippewa River Basin Partnership Team

Protection Of Shoreland
Impact Of Rural Development & Loss Of Farmland
Reducing Phosphorus & Nitrate Levels In Basin
Protection Of Existing High Quality Groundwater
Maintain Rural/Agricultural Landscapes
Problems & Opportunities For Changing Demographics Of Land Ownership
Coordination Of Resource Management Activities
Balancing Property Rights (Public Vs. Private)
Developing A Sense Of Stewardship / Environmental Ethics
Clean Rivers (Keeping Farm Animals Out And Chemicals Out)
Providing Incentives For Natural Land Management
Land Management And New Zoning Issues
Incentives For Private Land Management And Ownership For Public Access
Protect Corridors
Running Out Of Time To Save The Environment
Recreational Uses - Maintaining Natural Areas/Quality Experience
Rural Economic Decline & Loss Of Family Farm
Preservation Of Tiffany Wildlife Area (Keep Intact)
Urban Expansion
Impact Of Runoff On Water Quality
Coordinate Planning/Use Of Public Lands
Enhance Management Services/Education For Land Owners
Balance Wildlife Management (Deer)
Urban Area Land Management
Coordination Of Natural Resource Education In Basin
Access To Land For Recreation (Hunting)
Balancing Business & Natural Resources
Fish Management
Identification And Preservation Of Greenways
Local Regulations Don't Allow For Creative Rural Development Design
Recognizing Various Interest Groups
Alternative Funding For Conservation
Identification And Access To Funding (Coordination And Clearinghouse)

Maximization Of Current Conservation Funding (Use Cost-Benefit Analysis)

Limit Use Of Motorized Vehicles On Landscape

Ways To Deter Misuse Of Private/Public Lands

Erosion Control For Road/Home Building

Effects Of Increased Tourism On The Basin

Opportunity To Expand Conservation – Based Tourism

Keep Tributaries Clean

Appendix 10 - Basin Monitoring and Management Schedules and Plans

This appendix contains multiple-year proposed monitoring schedules for wadable streams and for lakes.

While these are recommended schedules, the actual scheduling is subject to change based on the availability of funding sources, changes in priorities and the need to use staff and resources to respond to more urgent unplanned events or opportunities that may arise.

Proposed Watershed Survey/Baseline Monitoring Schedule

Watershed name	Watershed code	Proposed survey schedule	
		comprehensive	baseline
Streams/watersheds managed out of Baldwin office			
Pine Creek / Red Cedar River	LC07		FY 01/02
Eau Galle River	LC03		FY 02/03
Hay River (part)	LC05		FY 02/03
Plum Creek	LC02		FY 03/04
South Fork Hay River	LC06		FY 03/04
Bear Creek	LC01		FY 04/05
Wilson Creek	LC04		FY 04/05
Trimbelle and Isabelle Creeks	LC23		FY 04/05
Rush River	LC22		FY 05/06
Streams/watersheds managed out of Chippewa Falls office			
Lower Yellow River (part)	LC19	FY '02	FY '02
Lower Yellow River (part)	LC19	FY '03	FY '03
Upper Yellow River (part)	LC20	FY '03	FY '03
Duncan Creek	LC18	FY '04	FY '04
Otter Creek	LC25	FY '04	FY '04
McCann Creek-Fisher River	LC21	FY '05	FY '05
Lower Eau Claire River	LC14	FY '06	FY '06
South Fork Eau Claire River	LC16	FY '07	FY '02
North Fork Eau Claire River	LC17	FY '08	FY '03
Black Creek-Hay Creek	LC15	FY '09	FY '04
Muddy Creek-Elk Creek	LC13	FY '10	FY '05

**Proposed fisheries, lake monitoring strategy for the years 2000 through 2009
for lakes managed out of the Baldwin office**

Tier I Lakes	Water-shed	County	Acres	Last Survey		Survey year	Survey type ¹			Survey year	Survey type ¹		
				any type	comprehensive		C	S	T		C	S	T
Lake Menomin	LC04	Dunn	1405	1999	1999	1999	x	x		2004		x	
Tainter Lake	LC04	Dunn	1752	1998	1998	2001			x	2006			x
Eau Galle Lake	LC03	Dunn	351	1997		2002		x		2007		x	
George Lake	LC03	Pierce	126	1995	1995	2003		x		2008		x	
Nuggett Lake	LC02	Pierce	116	1995	1995	2004		x		2009		x	

Tier II Lakes			Acres	Last Survey		Survey year	Survey type ¹			Survey year	Survey type ¹		
				any type	comprehensive		C	S	T		C	S	T
Elk Creek Lake	LC13	Dunn	54	1990		2002		x		2007		x	
Glen Lake	LC06	St. Croix	84	1995	1995	2003		x		2008		x	

**Proposed fisheries, lake monitoring strategy for the years 2000 through 2009
for lakes managed out of the Chippewa Falls office**

Tier I Lakes		County	Acres	Last Survey		Survey year	Survey type ¹			Survey year	Survey type ¹		
				any type	comprehensive		C	S	T		C	S	T
Lake Altoona	LC14	Eau Claire	840	1978	-	2001		x		2006	x	x	
Halfmoon Lake	LC18	Eau Claire	132	2000	2000	2001		x		2006		x	
Lake Eau Claire	LC15	Eau Claire	1118	1993	1960	2002		x		2007	x	x	
Chippewa Falls Flowage	LC18	Chippewa	282	1989	1989	2002		x		2007		x	
Lake Wisconsin	LC21	Chippewa	6300	1995-96	1989-90	2002	x	x		2007		x	
Pike Lake	LC19	Chippewa	192	1970	-	2003		x		2008	x	x	
Cornell Lake	LC21	Chippewa	194	1982	-	2003		x		2008	x	x	
Otter Lake	LC19	Chippewa	661	1983	-	2003	x	x		2008		x	
Silver Birch Lake	LC02	Pepin	169	1992-93	1992-93	2003		x		2008		x	
Rock Dam Lake	LC16	Clark	118	1988	-	2004		x		2009		x	
Mead Lake	LC16	Clark	320	1996	-	2004		x		2009	x	x	
Marshmill Lake	LC21	Chippewa	436	1969	-	2004	x	x		2009		x	
Cornell Flowage	LC21	Chippewa	836	1994	-					2009	x		
Old Abe Lake	LC21	Chippewa	996	1987-88	1987-88					2010	x		
Dells Pond	LC18	Eau Claire	739+	1995-96	1995-96								

Tier II Lakes			Acres	Last Survey		Survey year	Survey type ¹			Survey year	Survey type ¹		
				any type	comprehensive		C	S	T		C	S	T
Axehandle Lake	LCO8	Chippewa	84	2000	-	2000			x	2005	x		x
South Shattuck Lake	LC21	Chippewa	59	1979	-	2001		x		2006		x	
Lake Hallie	LC18	Chippewa	79	1984	-	2001	x		x	2006			x
Thompson Lake	LC03	Pepin	42	1991	-	2001		x		2006		x	
Coon Fork Flowage	LC15	Eau Claire	75	1993	1968	2002		x		2007		x	
Howe Lake	LC21	Chippewa	68	1980	-	2003		x		2008		x	
Bob Lake	LC21	Chippewa	97	1983	-	2003		x		2008		x	
Popple Lake	LC21	Chippewa	90	1991	-	2003		x		2008	x	x	
Como Lake	LC18	Chippewa	98	2000	2000	2004		x		2009		x	
Dead Lake	LC02	Pepin	68	1991	-	2004		x		2009		x	
Lowland Lake	LC21	Chippewa	11	1967	-								
Dark Lake	LCO8	Chippewa	13	1975	-								

Chapman Lake	LC17	Chippewa	34	1977	-									
Glen Loch Flowage	LC18	Chippewa	39	1979	-									
Hay Meadow Flowage No. 1	LC21	Chippewa	24	1982	-									
Horseshoe Lake	LC21	Chippewa	24	1991	-									
Fall Creek Pond	LC14	Eau Claire	17	1992	-									
Fairchild Pond	LC15	Eau Claire	18	1996	-									

¹ C - comprehensive survey; T - trends monitoring; S - status monitoring